AD-744 000

VERTICAL TAKE-OFF PLANES

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DDC-TAS-72-46

JUNE 1972

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13. ABSTRACT

References in this bibliography relate to design, configurations, flight testing, flight control systems, model tests, lift fans, shrouded propellers, rotary wings, aerodynamic characteristics, propulsion systems, performance engineering, capabilities and effectiveness of the Vertical Take-Off Planes. Computer generated indexes are included.

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UNCLASSIFIED

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Downwash						
Ground Effect						
Take-Off						
Aircraft Landings						
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Tilt Wings						
Airframes						
Flight Control Systems						
XV-5A Aircraft						
V-5 Aircraft						
Transition Flight						
C-142 Aircraft						
XC-142A Aircraft						

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VERTICAL TAKE-OFF PLANES

A DDC BIBLIOGRAPHY

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F O R E W O R D

This bibliography contains 199 unclassified references relating to *Vertical Take-Off Planes*. These references were selected from entries processed into the Defense Documentation Center's data bank during the period of January 1962 through January 1972.

This bibliography is a revision of AD-683 500.

Individual entries are arranged in AD number sequence under the heading AD Bibliographic References. Corporate Author-Monitoring Agency, Subject, Title, and Personal Author Indexes are included.

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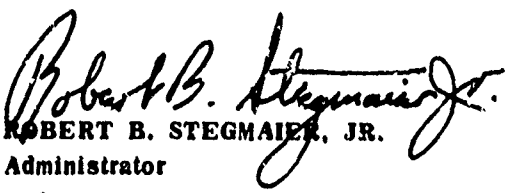

ROBERT B. STEGMAIER, JR.
Administrator
Defense Documentation Center

C O N T E N T S

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-426 234
DAVID TAYLOR MODEL BASIN WASHINGTON D C

RESULTS OF A VTOL PROPELLER-TYPE AIRCRAFT TESTED IN THE SUBSONIC WIND TUNNEL IN A HIGHSPEED CONFIGURATION. (U)

NOV 63 15P BAMBER,MILLARD J. ;
REPT. NO. DTMB-AERO-1062

UNCLASSIFIED REPORT

DESCRIPTORS: (•VERTICAL TAKE-OFF PLANES, DESIGN), ROTARY BLADES (ROTARY WINGS), WIND TUNNEL MODELS, FEASIBILITY STUDIES, MODEL TESTS, ROTARY WINGS, HOVERING, LIFT, DRAG, PITCH (MOTION), AERODYNAMIC CHARACTERISTICS, PERFORMANCE (ENGINEERING), SUBSONIC CHARACTERISTICS, PROPELLERS (AERIAL) (U)
IDENTIFIERS: 1963 (U)

THE ABILITY OF A PROPELLER TO DEVELOP A FORCE PERPENDICULAR TO THE AXIS OF ROTATION IS THE BASIS FOR A VTOL AIRCRAFT THAT APPEARS TO BE CAPABLE OF HOVERING, AND AT THE SAME TIME TO BE SUPERIOR TO EXISTING TYPES OF VTOL AIRCRAFT IN HIGH-SPEED PERFORMANCE. LOW-SPEED WIND-TUNNEL TEST RESULTS FOR A MODEL INDICATED A LIFT-DRAG RATIO OF 8 WITH PROPELLERS WINDMILLING IN THE HIGH-SPEED CONFIGURATION. FOR EXISTING VTOL AIRCRAFT, THE MAXIMUM LIFT-DRAG ATTAINED IN A HIGH-SPEED CONFIGURATION IS ABOUT 5. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-426 498
CENTRE NATIONAL D'ETUDES ET DE RECHERCHES AERONAUTIQUES
BRUSSELS (BELGIUM)

POWERED LIFT MODEL TESTING FOR GROUND PROXIMITY EFFECTS, (U)

OCT 63 IV COLIN,P. E. ;
REPT. NO. TCEA TN14
CONTRACT: DA91 591EUC2771

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, GROUND EFFECT), MODEL TESTS, PERFORMANCE (ENGINEERING), JETS, LIFT, PITCH (MOTION), AERODYNAMIC CHARACTERISTICS, PRESSURE, MOMENTUM, GROUND EFFECT MACHINES, WIND TUNNEL MODELS (U)
IDENTIFIERS: 1963 (U)

THE EFFECT OF GROUND PROXIMITY ON THE PERFORMANCE OF POWERED LIFT VEHICLES WAS INVESTIGATED ON SIMPLE MODELS USING TWO DIFFERENT TESTING METHODS. SINGLE AND DOUBLE-JET MODELS REPRESENTING VTOL CONFIGURATIONS AND AN AIR-CUSHION MODEL WITH PERIPHERAL JET WERE TESTED BOTH IN THE WIND TUNNEL WHERE A STATIONARY PLATE IMMERSED IN THE FLOW WAS USED TO REPRESENT THE GROUND AND ON A SPECIAL RIG ALLOWING THE MODELS TO BE MOVED OVER A FIXED-GROUND PLATE. THE LIFT AND CENTRE OF PRESSURE LOCATION HAVE BEEN DETERMINED WITH BOTH TECHNIQUES FOR VARIOUS MODEL HEIGHTS ABOVE THE GROUND-PLATE OVER A RANGE OF MOMENTUM COEFFICIENTS. RESULTS OBTAINED WITH BOTH METHODS ARE COMPARED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-426 785
GENERAL ELECTRIC CO CINCINNATI OHIO

RESULTS OF WIND TUNNEL TESTS OF A FULL-SCALE, WING-MOUNTED, TIP-TURBINE-DRIVEN LIFT FAN. (U)

SEP 63 379P
CONTRACT: DA-44-177-TC-584
PROJ: DA 1-D-121401-D-144
TASK: 1-D-121401-D-14402
MONITOR: TRECOM TR-63-21

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, SHROUDED PROPELLERS), (*SHROUDED PROPELLERS, DESIGN), LIFT, FANS, AERODYNAMIC CHARACTERISTICS, GAS TURBINES, INSTRUMENTATION, MODEL TESTS, WIND TUNNEL MODELS, DRAG, GROUND EFFECT, PERFORMANCE (ENGINEERING), EQUATIONS, MOTION, EXPERIMENTAL DATA, DESIGN, PRESSURE, GAS FLOW, TEMPERATURE, VELOCITY, MOMENTS, PITCH (MOTION), THRUST, ACCELERATION, STRESSES, TEST METHODS, THERMODYNAMICS. (U)
IDENTIFIERS: X-353 ENGINES, LIFT FANS. (U)

THE FULL-SCALE WING-TIP TURBINE-DRIVEN LIFT FAN WAS MODEL TESTED IN THE NASA AMES RESEARCH CENTER 40-FOOT BY 80-FOOT WIND TUNNEL. THIS SERIES OF TESTS HAS PROVIDED THE FIRST LARGE SCALE TEST DATA WITH FANS INSTALLED IN WINGS. DETAILED DISCUSSIONS AND TABULAR DATA ARE PRESENTED ON THE FOLLOWING: WIND TUNNEL MODEL; TEST INSTRUMENTATION, AND TEST PROCEDURES AND RESULTS. ANALYSIS OF RESULTS CONSIDERS THE BASIC AIRCRAFT PERFORMANCE (POWER OFF), FAN AERODYNAMIC PERFORMANCE, FAN THERMODYNAMIC PERFORMANCE, FAN POWERED AIRCRAFT PERFORMANCE, FAN MECHANICAL PERFORMANCE AND HARDWARE INSPECTION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-431 566
PRINCETON UNIV N J

SOME DYNAMIC ASPECTS OF STABILITY IN LOW-SPEED FLYING MACHINES, (U)

NOV 63 59P DUKES,THEODOR A. ;CARBALLAL, JOSE M. ;LION,PAUL M. ;
CONTRACT: DA-44-177-TC-835
PROJ: DA-1-D-121401-A-142
TASK: 1-D-121401-A-14203
MONITOR: TRECOM TR-63-56

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, ADAPTIVE CONTROL SYSTEMS), (*FLIGHT CONTROL SYSTEMS, VERTICAL TAKE-OFF PLANES), STABILITY, PITCH (MOTION), FEEDBACK, DAMPING, DIFFERENTIAL EQUATIONS, MATHEMATICAL ANALYSIS, ANALOG COMPUTERS, TIME, PROGRAMMING (COMPUTERS), LINEAR SYSTEMS, SUBSONIC CHARACTERISTICS (U)
IDENTIFIERS: 1963 (U)

THIS REPORT IS CONCERNED WITH A LINEAR TIME VARYING APPROXIMATION TO THE DYNAMICS OF LOWSPEED FLYING MACHINES. SIMPLIFICATIONS AND APPROXIMATIONS ARE APPLIED WIDELY IN ORDER TO EMPHASIZE ESSENTIAL ASPECTS. THE RANGE OF TIME VARIATION IS DESCRIBED IN TERMS OF FROZEN SYSTEM LOCI OF THE ROOTS CORRESPONDING TO THE PREDOMINANT MODE OF A SYSTEM. THE RATE OF THE TIME VARIATION IS DESCRIBED IN TERMS OF THE DEVIATION FROM THE FROZEN SYSTEM APPROXIMATION. AN ANALOG COMPUTER STUDY WAS MADE TO SPECIFY QUANTITATIVELY THOSE RATES OF TIME VARIATION WHICH CANNOT BE CONSIDERED AS SLOW. THE LONGITUDINAL DYNAMICS OF VTOL AIRCRAFT IS STUDIED AS AN EXAMPLE IN RATHER GENERAL TERMS. APPROXIMATIONS AND THE APPLICATION OF ROOT LOCUS METHODS IN TERMS OF THE MOST SIGNIFICANT STABILITY DERIVATIVES LEAD TO A CONSTRUCTION DESCRIBING THE BEHAVIOR OF THE OSCILLATORY ROOTS DURING TRANSITION. THE RESULTS ARE USED IN A DISCUSSION OF THE FOLLOWING VARIABLE FEEDBACK CONFIGURATIONS: DIRECT FEEDBACK ADJUSTMENTS, ADAPTIVE FEEDBACK, AND PROGRAMMED FEEDBACK ADJUSTMENTS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOH07

AD-447 839
GENERAL ELECTRIC CO CINCINNATI OHIO

XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT. (U)

DESCRIPTIVE NOTE: QUARTERLY TECHNICAL PROGRESS REPT. NO. 9, 16 NOV 63-15 FEB 64.
APR 64 15P
CONTRACT: DA44 177TC715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, RESEARCH PROGRAM ADMINISTRATION), RESEARCH PLANES, DUCTED FANS, DESIGN, EJECTION SEATS, TURBOJET ENGINES, GROUND SUPPORT EQUIPMENT, MODEL TESTS (U)
IDENTIFIERS: V-5 AIRCRAFT, LIFT FAN, J-85 ENGINES (U)

DURING THE NINTH QUARTER (NOVEMBER 16, 1963 TO FEBRUARY 15, 1963) PROGRESS UNDER THE PROPULSION SYSTEM PROGRAM INCLUDED: (1) SEVEN TECHNICAL PROGRAM REPORTS COMPLETED AND TRANSMITTED TO TRECOM WITH THE REMAINING DATA NECESSARY FOR LOW SPEED FLIGHT CLEARANCE BEARING COMPLETION; (2) REVISION TO MAINTENANCE MANUAL COMPLETED; (3) PROPULSION SYSTEM SPARE PARTS, QUANTITIES, PRICE CONTROL, AND AUTHORITY FOR USE ESTABLISHED WITH TRECOM; (4) SPARE J85 ENGINES, ONE LIFT FAN, ONE PITCH FAN, PLUS ENGINE AND FAN SPARE COMPONENTS PACKAGED FOR SHIPMENT TO EDWARDS; (5) PROVIDED PROPULSION SYSTEM SUPPORT DURING AIRCRAFT GROUND TESTS; AND (6) PREPARATION FOR FULL SCALE WIND TUNNEL TEST WAS COMPLETED IN TERMS OF DETAIL TEST PLAN, INSTRUMENTATION, TEST FIXTURES, AND DATA REDUCTION PROGRAM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZUM07

AD-452 792
KELLETT AIRCRAFT CORP PHILADELPHIA PA

EFFECTS OF AIRFRAME GEOMETRY ON DOWNWASH PROBLEMS OF TANDEM DUCTED-PROPELLER VTOL AIRCRAFT. (U)

DESCRIPTIVE NOTE: REPT. FOR JUL 61-MAY 63,
JAN 64 115P PRUYN,RICHARD R.
REPT. NO. 179T80 6
CONTRACT: NOw-61-0926

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: *VERTICAL TAKE-OFF PLANES, DUCTED FANS), (*DUCTED FANS, DOWNWASH), MODEL TESTS, GROUND EFFECT, PERFORMANCE (ENGINEERING), AERODYNAMIC CHARACTERISTICS, INTERFERENCE, DUCTS, DEFLECTION, FLUID DYNAMIC PROPERTIES, AERODYNAMIC CONFIGURATIONS, DUCT INLETS (U)
IDENTIFIERS: TANDEM PROPELLERS (U)

A FULL SCALE HALF-MODEL SIMULATION OF A DUAL TANDEM DUCTED PROPELLER VTOL AIRCRAFT HAS BEEN TESTED AT HEIGHTS OF LESS THAN TWO DUCT DIAMETERS ABOVE SAND AND WATER TERRAIN. DATA ON TERRAIN TRANSPORT, TERRAIN CAUSED AIRCRAFT DAMAGE, FLOW FIELD MEASUREMENTS AND DUCTED PROPELLER PERFORMANCE WERE OBTAINED. THESE TESTS WERE CONDUCTED AT PROPELLER DISC LOADINGS UP TO 60 POUNDS PER SQUARE FOOT WITH VARIOUS AIRCRAFT CONFIGURATIONS AND DUCTED PROPELLER ORIENTATIONS. THE DUAL TANDEM CONFIGURATION WAS FOUND TO CAUSE A SIGNIFICANT INCREASE IN DOWNWASH PROBLEMS COMPARED TO ISOLATED PROPELLER CONFIGURATIONS PREVIOUSLY TESTED. REDUCED PERFORMANCE, SEVERE ENGINE AND PROPELLER DAMAGE AND AN OSCILLATING AERODYNAMIC INTERFERENCE WERE EXPERIENCED. SEVERAL PROMISING DEVICES TO ALLEVIATE DOWNWASH PROBLEMS WERE EVALUATED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-453 315
ROYAL AIRCRAFT ESTABLISHMENT FARNBOROUGH (ENGLAND)

THE STATIC PRESSURE DISTRIBUTION AROUND A CIRCULAR JET EXHAUSTING NORMALLY FROM A PLANE WALL INTO AN AIRSTREAM. (U)

AUG 64 37P BRADBURY,L. J. S. ;WOOD, M. N. ;
REPT. NO. TN AERO2978

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES: LIFT), (*JETS, AXIALLY SYMMETRIC FLOW), PRESSURE, DISTRIBUTION, BOUNDARY LAYER, THICKNESS, REYNOLDS NUMBER, AERODYNAMIC CHARACTERISTICS, WINGS, WIND TUNNEL MODELS, VELOCITY, MEASUREMENT, INTERFERENCE (U)

MEASUREMENTS HAVE BEEN MADE OF THE STATIC PRESSURE DISTRIBUTION ON THE WALL AROUND A CIRCULAR JET EXHAUSTING NORMALLY FROM ONE WALL OF A WIND TUNNEL INTO THE MAINSTREAM FLOW THROUGH THE TUNNEL. THE MEASUREMENTS SHOW THE WAY IN WHICH THE PRESSURE DISTRIBUTIONS VARY WITH THE RATIO OF JET TO FREE-STREAM VELOCITY AND ALSO SHOW THE REGIONS ON THE WALL WHICH CONTRIBUTE MOST TO THE OVERALL SUCTION FORCE ON THE WALL. THESE OVERALL SUCTION FORCES ARE SHOWN TO BE OF THE RIGHT ORDER OF MAGNITUDE TO ACCOUNT FOR THE LIFT LOSS OBSERVED ON MODELS OF DIRECT JET LIFT VTOL AIRCRAFT. THEORETICAL WORK ON THE PROBLEM IS BRIEFLY DISCUSSED AND IT IS SHOWN THAT A PARTICULARLY SIMPLE MODEL OF THE FLOW WHICH HAS PREVIOUSLY BEEN SUGGESTED ON A NUMBER OF OCCASIONS IS NOT REALLY ADEQUATE. SOME DETAILS OF AN ALTERNATIVE MODEL WHICH IS PROVING MORE SUCCESSFUL ARE GIVEN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-455 562
AIR FORCE AERO PROPULSION LAB WRIGHT-PATTERSON AFB
OHIO

TEST RESULTS OF RESEARCH FOR RAPID SITE PREPARATION FOR VTOL AIRCRAFT. (U)

DESCRIPTIVE NOTE: REPT. FOR AUG 62-AUG 64,
NOV 64 41P VASILOFF,A. ;
REPT. NO. FDR64 104
PROJ: 8174
TASK: 817401

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LANDING FIELDS, PREPARATION), (*VERTICAL TAKE-OFF PLANES, LANDING FIELDS), SITE SELECTION, SOIL MECHANICS, BLAST, AFTERBURNERS, TURBOJET ENGINES, DUST, SPRAYS, AREA COVERAGE, AIR DROP OPERATIONS, POLYESTER PLASTICS, BORIC ACIDS, FEASIBILITY STUDIES, EPOXY PLASTICS, RESORCINOL, FORMALDEHYDE, GLASS TEXTILES, ISOCYANATE PLASTICS, CONCRETE, SODIUM COMPOUNDS, SILICATES, ZIRCONUM, CEMENTS, CERAMIC MATERIALS, CONSTRUCTION (U)
IDENTIFIERS: X-14 AIRCRAFT, J-85 ENGINES (U)

TO OPERATE VTOL AIRCRAFT IN REMOTE FRONT-LINE AREAS, SITES MUST BE PREPARED TO PREVENT FLYING FOREIGN OBJECTS FROM DAMAGING THE AIRCRFT. RESEARCH WAS CONDUCTED TO DETERMINE WHETHER ANY QUICK-SETTING SOIL HARDENERS COULD WITHSTAND THE BLAST ENVIRONMENT OF THE VTOL AFTERBURNER. SAMPLES OF NUMEROUS MATERIALS WERE TESTED IN A SPECIAL VTOL TEST FACILITY CONSISTING OF A J-85-5 JET ENGINE WITH AFTERBURNER THAT COULD BE ROTATED TO A VERTICAL POSITION TO DUPLICATE GROUND CONDITIONS IMPOSED BY THE VTOL JET BLAST. A FASTCURING, SPRAYABLE, RESIN FORMULATION WAS DEVELOPED AND TESTED, AND FULL-SCALE TESTS WERE MADE WITH AN X-14 VTOL AIRCRAFT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-461 017
GENERAL ELECTRIC CO CINCINNATI OHIO

XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT. (U)

DESCRIPTIVE NOTE: QUARTERLY TECHNICAL PROGRESS REPT. NO. 10, 17 FEB-15 MAY 64.
JUL 64 1V
CONTRACT: DA44 177TC715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, RESEARCH PROGRAM ADMINISTRATION), (*RESEARCH PLANES, VERTICAL TAKE-OFF PLANES), TURBOJET ENGINES, DUCTED FANS, SPARE PARTS, MODIFICATION KITS, CAPTIVE TESTS, WIND TUNNEL MODELS, DESIGN, LOADING (MECHANICS), ACTUATORS, FLIGHT TESTING, NOSE WHEELS, TAXIING, LANDING GEAR, MALFUNCTIONS, LIFT, CORRECTIONS, EJECTION SEATS, RESONANCE, INSTRUMENTATION, MAINTENANCE, STABILITY, FLIGHT CONTROL SYSTEMS, STRUCTURAL PROPERTIES, TEMPERATURE, RELIABILITY, HOVERING, SIMULATION, WEIGHT, FLUTTER (U)
IDENTIFIERS: V-5 AIRCRAFT, J-85 ENGINES, LOUVERS, LIFT ENGINES (U)

PROPULSION SYSTEM DELIVERIES WERE COMPLETED WITH ACCEPTANCE OF THE LAST SPARE LIFT FAN. FAN SPEED VTOL AND CTOL FLIGHT CLEARANCE WAS REQUESTED AND GRANTED FOR A/C NUMBER TWO. LIFT FAN AND J85 SPARE PARTS WERE SHIPPED TO EDWARDS AIR FORCE BASE. NUMBER ONE A/C COMPLETED MODIFICATION AND GROUND TESTS AT NASA-AMES PRIOR TO FULL SCALE WIND TUNNEL TESTS. ENGINEERING DESIGN AND ANALYSIS WAS COMPLETED FOR THE HIGHER LOADING IN THE EXIT LOUVER ACTUATION SYSTEM. BOTH AIRCRAFT COMPLETED SYSTEMS FUNCTIONAL TESTS AT SAN DIEGO. A/C NUMBER TWO WAS SHIPPED TO EDWARDS AFB TO BEGIN FLIGHT TESTS AND A/C NUMBER ONE WAS SHIPPED TO NASA-AMES FOR WIND TUNNEL TESTING. NOSE WHEEL SHIMMY ENCOUNTERED DURING TAXI TESTS CAUSING AIRCRAFT DAMAGE. NOSE GEAR REDESIGN AND SUCCESSFUL DYNAMIC AND STATIC TESTS WERE COMPLETED. A SYSTEMS FAILURE EVALUATION WAS CONDUCTED ON THE FLIGHT SIMULATOR TO ESTABLISH EMERGENCY PROCEDURES. A/C DAMAGE AS A RESULT OF NOSE GEAR FAILURE WAS CORRECTED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-461 447
LING-TEMCO-VOUGHT INC DALLAS TEX LTV VOUGHT AERONAUTICS DIV

XC-142A VTOL TRANSPORT PROGRAM. (U)

DESCRIPTIVE NOTE: MONTHLY PROGRESS REPT.
SEP 64 29P
CONTRACT: AF33 657 7868

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*TRANSPORT PLANES, VERTICAL TAKE-OFF PLANES), (*VERTICAL TAKE-OFF PLANES, TRANSPORT PLANES), FLIGHT TESTING, PERFORMANCE (ENGINEERING), TAXIING, AIRCRAFT EQUIPMENT, SPARE PARTS, MANUFACTURING METHODS (U)
IDENTIFIERS: C-142 AIRCRAFT, VTOL (U)

A MAJOR MILESTONE WAS ACCOMPLISHED WITH ACHIEVEMENT OF THE FIRST FLIGHT OF THE XC-142A. THE FLIGHT, MADE ON THE 2 AIRCRAFT, WAS 38 MINUTES IN LENGTH DURING WHICH TIME THE AIRCRAFT HANDLING CHARACTERISTICS WERE CHECKED AT AN ALTITUDE OF 10,000 FEET AND A SPEED OF APPROXIMATELY 150 KNOTS, WITH LANDING GEAR DOWN THROUGHOUT THE ENTIRE FLIGHT; TAKEOFF AND LANDING WERE MADE WITH WING AND FLAPS AT 10 DEGREES. THROUGHOUT THE FLIGHT, THE AIRCRAFT DEMONSTRATED SMOOTH RESPONSE AND STABLE AERODYNAMIC CHARACTERISTICS. SEVERAL OTHER ITEMS OF SIGNIFICANCE WERE ACCOMPLISHED IN THE OVERALL TEST PROGRAM. HIGH SPEED TAXI TESTS ON THE 2 AIRCRAFT WERE ACHIEVED; THE 50-HOUR TIE-DOWN TEST ON THE 1 AIRCRAFT WAS COMPLETED, AS WELL AS THE TEARDOWN INSPECTION OF TRANSMISSION AND PROPULSION SYSTEM COMPONENTS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-461 455
GENERAL ELECTRIC CO CINCINNATI OHIO

XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT. (U)

DESCRIPTIVE NOTE: QUARTERLY TECHNICAL PROGRESS REPT. NO. 11, 16 MAY-15 AUG 64.
OCT 64 129P
CONTRACT: DA44 177TC715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, RESEARCH PROGRAM ADMINISTRATION), (*RESEARCH PLANES, RESEARCH PROGRAM ADMINISTRATION), DUCTED FANS, DESIGN, ENGINEERING, TURBOJET ENGINES, STABILITY, FLIGHT CONTROL SYSTEMS, SIMULATION, AIRFRAMES, TEMPERATURE, WIND TUNNEL MODELS, MODEL TESTS, HEAT TRANSFER, COOLING, RELIABILITY, MANUFACTURING METHODS, CAPTIVE TESTS, FLIGHT TESTING, PERFORMANCE (ENGINEERING), HANDLING, MANEUVERABILITY, HOVERING, COMPRESSORS, STALLING, LANDING GEAR, NOSE WHEELS, TAILS (AIRCRAFT), EXPERIMENTAL DATA, GRAPHICS (U)
IDENTIFIERS: V-5 AIRCRAFT, J-85 ENGINES, VANES (U)

THE LATERAL CONTROL INVESTIGATION WAS COMPLETED WITH THE STATIC LOAD TEST SUCCESSFULLY COMPLETED AT SAN DIEGO, THE NECESSARY HARDWARE MANUFACTURED AND MODIFICATION TO AIRCRAFT NUMBER 2 COMPLETED, WITH EDWARDS VERTICAL THRUST STAND PLUS FLIGHT TESTING VERIFICATION OF THE INCREASED LATERAL CONTROL POWER. FULL SCALE WIND TUNNEL TESTING WAS COMPLETED WITH AIRCRAFT NUMBER 1, AND THE AIRCRAFT RETURNED TO EDWARDS FOR PREPARATION FOR FLIGHT TEST. LIFT FAN INLET VANE FAILURES WERE EXPERIENCED DURING THE WIND TUNNEL TESTS, MODIFICATIONS DESIGNED, MANUFACTURED, AND TESTED TO ESTABLISH A FLIGHT ENVELOPE. POTENTIAL LONGITUDINAL TRIM PROBLEMS WERE SEEN DURING THE WIND TUNNEL, A HORIZONTAL TAIL SLAT AND INSTRUMENTATION BOOM FOR MEASURING TAIL ANGLE OF ATTACK WERE DESIGNED AND INSTALLED ON AIRCRAFT NUMBER 2. THE NOSE WHEEL SHIMMY INVESTIGATION WAS COMPLETED AND MODIFICATIONS ACCOMPLISHED TO THE AIRCRAFT WHICH ALLOWED SUCCESSFUL CONVENTIONAL FLIGHTS TO COMMENCE MAY 25, 1964. INITIAL HOVER FLIGHTS BEGAN ON JULY 16, 1964. A J85 STALL INVESTIGATION WAS CONDUCTED AS A RESULT OF SEVERAL COMPRESSOR STALLS EXPERIENCED DURING FLIGHT.

11 (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-475 412 1/2 20/4
NAVAL POSTGRADUATE SCHOOL MONTEREY CALIF

AN ANALYSIS OF GROUND EROSION CAUSED BY JET DOWNWASH IMPINGEMENT. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
65 101P SHUTER,DAVID V. ;

UNCLASSIFIED REPORT

DESCRIPTORS: (*DOWNWASH, *VERTICAL TAKE-OFF PLANES), EROSION, SHORT TAKE-OFF PLANES, LANDING FIELDS, AERODYNAMIC LOADING, AERODYNAMIC CHARACTERISTICS, FLOW FIELDS, JET PLANES, FLUID FLOW, BOUNDARY LAYER, THEORY, EXHAUST NOZZLES, EXPERIMENTAL DATA, MATHEMATICAL MODELS, TERRAIN, LIFT, DRAG, PRESSURE, NOZZLES, HAZARDS, SAFETY (U)
IDENTIFIERS: FORTRAN, THESES (U)

RECENT INTEREST IN MILITARY VTOL/STOL AIRCRAFT EMPLOYING UNPREPARED LANDING SITES HAS LED TO INTEREST IN THE PROBLEM OF LANDING SURFACE EROSION. SURFACE EROSION IS CAUSED BY THE AERODYNAMIC FORCES ON GROUND PARTICLES EXISTING WITHIN THE FLOW FIELD OF AN IMPINGING JET. THE INVISCID FLOW FIELD IS DISCUSSED AND THE VISCOUS GROUND BOUNDARY LAYER IS ANALYZED UTILIZING BOTH THEORY AND AVAILABLE EXPERIMENTAL DATA. A MATHEMATICAL MODEL OF THE PROCESS OF ENTRAINMENT OF GROUND PARTICLES IS CONSTRUCTED. EROSION RATES IN THE FORM OF EROSION PROFILES ARE PREDICTED FOR SELECTED JET CONFIGURATION AND TYPES OF TERRAIN. A CRITERION FOR ENTRAINMENT, DUE TO BOTH LIFT AND DRAG, WAS FOUND AND PRESENTED FOR SELECTED DISTANCES FROM THE JET CENTERLINE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-430 995 20/4 1/3
THERM ADVANCED RESEARCH INC ITHACA N Y

A COMPARISON OF DUCTED PROPELLER THEORY WITH BELL X-22A EXPERIMENTAL DATA. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
DEC 65 15P HOUGH ,GARY R. ;KASKEL, ALVIN L. ;
REPT. NO. TAR-TR-6510
CONTRACT: NONR-4357(00)
PROJ: NR-212-103

UNCLASSIFIED REPORT

DESCRIPTORS: (*SHROUDED PROPELLERS, PRESSURE), (*VERTICAL TAKE-OFF PLANES, SHROUDED PROPELLERS), LEVEL FLIGHT, THREE-DIMENSIONAL FLOW, THEORY, MATHEMATICAL PREDICTION, DUCTED BODIES, WIND TUNNEL MODELS, MODEL TESTS, PERFORMANCE(ENGINEERING), EXPERIMENTAL DATA, DISTRIBUTION, RESEARCH PLANES, MATHEMATICAL MODELS, DUCTED BODIES, VORTICES, THICKNESS, CAMBER, RING WINGS, AERODYNAMIC LOADING, THRUST, PITCH(MOTION), MOMENTS, CYLINDRICAL BODIES, PROPELLERS(AERIAL), SHROUD RINGS, AERODYNAMIC CONFIGURATIONS (U)
IDENTIFIERS: X-22 AIRCRAFT (U)

FOR THE FORWARD FLIGHT REGIME, A LIMITED COMPARISON IS MADE BETWEEN THEORETICAL PREDICTIONS OF DUCT PRESSURE DISTRIBUTIONS AND DATA OBTAINED FROM ONE-THIRD AND FULL SCALE MODEL TESTS OF THE X-22A DUCTED PROPELLER UNIT. THE THEORETICAL CALCULATIONS ARE BASED UPON PREVIOUS STUDIES OF DUCTED PROPELLERS WITH FINITE BLADE NUMBER. IT IS FOUND THAT THE THEORY IS IN REASONABLE AGREEMENT WITH EXPERIMENT AND GENERALLY TENDS TO UNDERESTIMATE THE MEASURED PRESSURES. ALSO, THE CHARACTERISTIC SHAPE OF THE PREDICTED DISTRIBUTION AGREES WELL WITH THE MEASURED DISTRIBUTION. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-482 075 1/3 13/8
LTV VOUGHT AERONAUTICS DIV LING-TEMCO-VOUGHT INC DALLAS TEX

XC-142A VTOL TRANSPORT PROGRAM. (U)

DESCRIPTIVE NOTE: MONTHLY PROGRESS REPT. NO. 29, MAY 64, MAY 64 33P
CONTRACT: AF 33(657)-7868

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *TRANSPORT PLANES), TILT WINGS, PRODUCTION, CALIBRATION, CHECKOUT PROCEDURES, SCHEDULING, FLIGHT CONTROL SYSTEMS, HEAT TRANSFER, GEARS, FLIGHT TESTING, LANDINGS, FUEL SYSTEMS, STATICS, DROP TESTING, PROPELLERS(AERIAL), QUALITY CONTROL, CAPTIVE TESTS (U)
IDENTIFIERS: C-142 AIRCRAFT (U)

XC-142A VTOL TRANSPORT PROGRAM.

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-482 131 1/3
PITTSBURGH UNIV WASHINGTON D C RESEARCH STAFF

RESEARCH AIRCRAFT, XV-5A. (U)

DESCRIPTIVE NOTE: INTERIM REPT.
APR 66 12P
CONTRACT: DA-49-186-AMC-214(D)
MONITOR: AMC TIR-18.1.3.1

UNCLASSIFIED REPORT

DESCRIPTORS: (*RESEARCH PLANES, VERTICAL TAKE-OFF PLANES), (*VERTICAL TAKE-OFF PLANES, DUCTED FANS), DESIGN, AIRFRAMES, SUBSONIC FLOW, TURBOJET ENGINES, LIFT, THRUST (U)
IDENTIFIERS: J-85 ENGINES, V-5 AIRCRAFT (U)

THIS REPORT TRACES THE DEVELOPMENT OF THE XV-5A RESEARCH AIRCRAFT. THE AIRCRAFT, THOUGH PURELY EXPERIMENTAL, DEMONSTRATES THE PRACTICABILITY OF VTOL LIFT-FAN PROPELLED FLIGHT, COMBINED WITH CONVERSION FROM THE VTOL MODE TO THE CTOL MODE AND FLIGHT IN THE PURELY CONVENTIONAL MODE. THE XV-5A IS AN ALL-METAL, TWIN ENGINE, GAS-PROPELLED, SUBSONIC, TRI-FAN, TRICYCLE LANDING GEAR, VTOL/CTOL AIRCRAFT. IT IS 44.52 FT. LONG. ITS WINGSPAN IS 29.83 FT., AND ITS HEIGHT TO THE TOP OF THE VERTICAL STABILIZER IS 14.75 FT. IT IS POWERED BY TWO J85-5B TURBOJET ENGINES. ITS TWO X353-5 WING FANS(LIFT) ARE 62.5 IN. IN DIAMETER. ITS X373-A NOSE FAN (PITCH CONTROL, AND LIFT) IS 36 IN. IN DIAMETER AND IS LOCATED IN THE NOSE AHEAD OF THE COCKPIT. ALL FANS ARE OPERATED BY DIVERTING ENGINE EXHAUST GASES THROUGH CROSSOVER DUCTS TO THE TIP TURBINES ON THE RIMS OF THE FANS. THRUST LOUVERS BELOW THE FANS CONTROL THE THRUST GENERATED BY THE REVOLVING FANS AND EXHAUST GASES. MODIFICATIONS SUGGESTED AS A RESULT OF TESTS ARE BEING MADE AND POSSIBLE MILITARY APPLICATIONS OF LIFT-FAN PRINCIPLES OF PROPULSION TO HEAVY AIRCRAFT ARE BEING MADE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-482 425 1/3
LTV VOUGHT AERONAUTICS DIV LING-TEMCO-VOUGHT INC DALLAS TEX

XC-142A VTOL TRANSPORT PROGRAM. (U)

DESCRIPTIVE NOTE: MONTHLY PROGRESS REPT. NO. 25, FOR JAN 64.
JAN 64 32P
CONTRACT: AF 33(657)-7868

UNCLASSIFIED REPORT

DESCRIPTORS: (•VERTICAL TAKE-OFF PLANES, •TRANSPORT PLANES), DESIGN, SCHEDULING, TEST METHODS, FLIGHT TESTING, AIRPLANE MODELS, TEST EQUIPMENT, FLIGHT CONTROL SYSTEMS, AIRFRAMES, VIBRATION, EJECTION SEATS, SPARE PARTS, GROUND SUPPORT EQUIPMENT, AIR FORCE TRAINING, AIR FORCE PROCUREMENT, ASSEMBLING, AIRCRAFT EQUIPMENT, GROUND EFFECT (U)
IDENTIFIERS: C-142 AIRCRAFT (U)

XC-142A VTOL TRANSPORT PROGRAM.

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-486 371 1/3
LTV VOUGHT AERONAUTICS DIV LING-TEMCO-VOUGHT INC DALLAS TEX

XC-142A VTOL TRANSPORT PROGRAM. (U)

DESCRIPTIVE NOTE: MONTHLY PROGRESS REPT. NO. 50 FOR FEB 66.
FEB 66 16P
CONTRACT: AF 33(657)-7868

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *TRANSPORT PLANES), RESEARCH PROGRAM ADMINISTRATION, SCHEDULING, TRANSMISSIONS, TILT WINGS, FLIGHT TESTING, TIME, TAXIING, TAKE-OFF, HOVERING, WATER, RUNWAYS, RUBBER COATINGS, MEMBRANES, LANDING MATS, ACTUATORS, DE-ICING SYSTEMS, THRUST, PROPELLERS(AERIAL) (U)
IDENTIFIERS: C-142 AIRCRAFT (U)

A TOTAL OF 141 FLIGHTS AND 20.5 FLIGHT HOURS WERE ACHIEVED. THESE FLIGHTS INCLUDED TAXI RUNS AND STOL OPERATIONS WITH WATER ON THE RUNWAY, THE FIRST VERTICIRCUIT AT NIGHT, STOL PASSES AND HOVER OVER WATER, OFF-RUNWAY TESTS VERTICAL LANDINGS ON A RUBBERIZED MEMBRANE AND STOL AND HOVER WORK OVER FORWARD AREA LANDING MATS. THE CATEGORY 1 FLIGHT TOTAL REMAINED AT 191 FLIGHTS AND 136 HOURS AND 25 MINUTES OF FLIGHT TIME WHILE THE CATEGORY 2 FLIGHTS NUMBERED 46 FOR 54 HOURS AND 24 MINUTES OF FLIGHT TIME. TOTAL TIME ON THE FOUR AIRCRAFT AMOUNTED TO 237 FLIGHTS FOR 190 HOURS AND 49 MINUTES. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-486 942 1/3 1/5
LTV VOUGHT AERONAUTICS DIV LING-TEMCO-VOUGHT INC DALLAS TEX

XC-142A VTOL TRANSPORT PROGRAM. (U)

DESCRIPTIVE NOTE: MONTHLY PROGRESS REPT. NO. 48 FOR DEC 65,
DEC 65 16P HESSE,W. J. ;
CONTRACT: AF 33(657)-7868

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *TRANSPORT PLANES), PERFORMANCE(ENGINEERING), FLIGHT TESTING, TURBOPROP ENGINES, ACOUSTIC PROPERTIES, THRUST, STABILITY, STATICS, FLIGHT CONTROL SYSTEMS, AUTOMATIC, SYNCHROS, FLAPS, DUCT INLETS, LEADING EDGE, PROPELLERS(AERIAL), GROUND SUPPORT EQUIPMENT (U)
IDENTIFIERS: C-142 AIRCRAFT (U)

DURING THE MONTH, NO. 1 AIRCRAFT MADE A TOTAL OF 14 FLIGHTS FOR 9 HOURS 33 MINUTES FLIGHT TIME, BRINGING THE TOTAL CUMULATIVE TIME FOR THE AIRCRAFT TO 50 HOURS 16 MINUTES IN 69 FLIGHTS. SIGNIFICANT FLIGHT TEST ACCOMPLISHMENTS DURING THE MONTH INCLUDED ACOUSTICAL MEASUREMENTS, ENGINE JET THRUST DETERMINATION, FLYING QUALITY EVALUATION, OFF-FLAP PROGRAMMING, AND LONGITUDINAL STATIC STABILITY INVESTIGATIONS. AT THE END OF THE REPORTING PERIOD, A TOTAL OF 18 PERSONS HAD FLOWN THE XC-142A AIRCRAFT INCLUDING TWO AIR FORCE GENERAL OFFICERS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-486 998 1/3
LTV VOUGHT AERONAUTICS DIV LING-TEMCO-VOUGHT INC DALLAS TEX

XC-142A VTOL TRANSPORT PROGRAM. (U)

DESCRIPTIVE NOTE: MONTHLY PROGRESS REPT. NO. 52, APR 66.
APR 66 19P
CONTRACT: AF 33(657)-7868

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, SYSTEMS ENGINEERING), (*TRANSPORT PLANES, VERTICAL TAKE-OFF PLANES), PROPELLERS(AERIAL), AERODYNAMIC CONFIGURATIONS, STRESSES, HOVERING, TAXIING, FLIGHT TESTING, PERFORMANCE(ENGINEERING), SPARE PARTS, GROUND SUPPORT EQUIPMENT, AIR FORCE TRAINING, TRAINING DEVICES, SCHEDULING (U)
IDENTIFIERS: C-142 AIRCRAFT (U)

THE OVER-ALL XC-142A PROGRAM WAS ON SCHEDULE. EVALUATION OF THE NEW CONFIGURATION PROPELLERS (2FF) WAS ACCOMPLISHED ON THE NO. 1 AIRCRAFT WITH GOOD RESULTS. IN ADDITION TO PROP STRESS MEASUREMENTS IN THE HOVER AND CONVENTIONAL FLIGHT MODES, THE AIRCRAFT ACCOMPLISHED A NUMBER OF TAXI TESTS OVER SIMULATED BUMPS ON THE RUNWAY. THE REMAINDER OF THE PERIOD WAS DEVOTED TO READYING THE AIRCRAFT FOR DELIVERY. THE NO. 2 AIRCRAFT PROGRESSED SATISFACTORY THROUGH PORTIONS OF REPAIR WORK, LEADING TO DELIVERY. THE NO. 5 AIRCRAFT UNDERWENT CLEAN CONFIGURATION SHAKEDOWN EARLY IN PREPARATION FOR DELIVERY. THE NO. 3 AIRCRAFT REMAINED IN A DORMANT STATUS, PENDING A REPAIR DECISION. THE NO. 4 AIRCRAFT RETURNED TO FLIGHT STATUS. FLIGHTS WERE CONDUCTED PRIMARILY FOR EXTRACTION CHUTE TOW TESTS TO DETERMINE EXTRACTION LOADS AT VARIOUS SPEEDS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-486 999 1/3
LTV VOUGHT AERONAUTICS DIV LING-TEMCO-VOUGHT INC DALLAS TEX

XC-142A VTOL TRANSPORT PROGRAM. (U)

DESCRIPTIVE NOTE: MONTHLY PROGRESS REPT. NO. 44 FOR AUG 65,
AUG 65 20P HESSE,W. J. ;
CONTRACT: AF 33(657)-7868

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, PERFORMANCE(ENGINEERING)), FLIGHT TESTING, PITCH(MOTION), DESIGN, SPARE PARTS, HANDLING, CONTROL, MANEUVERABILITY, AIRSPEED, SHORT TAKE-OFF PLANES, NIGHT FLIGHT, INSTRUMENT LANDINGS, HOVERING, GROUND SUPPORT EQUIPMENT, AERODYNAMIC CONTROL SURFACES, WIND TUNNEL MODELS, MODEL TESTS (U)
IDENTIFIERS: C-142 AIRCRAFT (U)

CONTENTS: DEVELOPMENT OF XC-142A AND FABRICATION OF FIVE PROTOTYPE MODELS; FABRICATION OF MOCKUP; GROUND TEST PROGRAM; ENGINEERING DATA; DESIGN DATA; FLIGHT TEST; REPORTS; SPARE PARTS FOR FIVE PROTOTYPE AIRPLANES; AND DEVELOPMENT AND FABRICATION OF AGE. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-487 001 1/3
LTV VOUGHT AERONAUTICS DIV LING-TEMCO-VOUGHT INC DALLAS TEX

XC-142A VTOL TRANSPORT PROGRAM. (U)

DESCRIPTIVE NOTE: MONTHLY PROGRESS REPT. NO. 53 FOR MAY 66.
MAY 66 27P
CONTRACT: AF 33(657)-7868

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, TRANSPORT PLANES), RESEARCH PROGRAM ADMINISTRATION, PROPELLERS(AERIAL), STRESSES, HOVERING, AIRCRAFT LANDINGS, TAKE-OFF, AIR DROP OPERATIONS, WEIGHT, PARACHUTE JUMPING, AIRCRAFT FIRES, ENGINE NACELLES, HYDRAULIC COUPLINGS, CARRIER LANDINGS, WIND, DISCONNECT FITTINGS, ACTUATORS, FLEXIBLE COUPLINGS, FLIGHT TESTING, PERFORMANCE(ENGINEERING), TAXIING, TRANSMISSIONS (U)
IDENTIFIERS: C-142 AIRCRAFT (U)

FLIGHTS ON THE NO. 1 AIRCRAFT WERE ACCOMPLISHED TO OBTAIN PROP STRESS DATA AND TO EVALUATE FLYING QUANTITIES WITH THE NEW CONFIGURATION PROPELLERS (2FF). IN ADDITION, THE AIRCRAFT HOVERED OVER, LANDED AND TOOK OFF VERTICALLY FROM A 120 FT DIAMETER HELICOPTER LANDING PAD OF POLYESTER RESIN AND FIBERGLASS. A COMPLETELY SUCCESSFUL AIR DROP PROGRAM WAS CONDUCTED AT UTILIZING THE NO. 4 AIRCRAFT. IN 8 HOURS AND 29 MINUTES OF FLIGHT TIME, THE AIRCRAFT ACCOMPLISHED APPROXIMATELY FORTY DROPS OF VARIOUS KINDS, INCLUDING LOADS RANGING FROM 500 TO 4000 POUNDS, 5 AND 95 PERCENTILE DUMMIES AND 10 PARATROOPERS. METHODS EMPLOYED INCLUDED EXTRACTION, GRAVITY AND 'DUMP TRUCK' AT VARIOUS ALTITUDES AND FORWARD SPEEDS FROM ZERO TO 125 KNOTS. THE NO. 5 AIRCRAFT FLEW FROM EAFB TO THE AIRCRAFT CARRIER USS BENNINGTON FOR FLIGHT EVALUATION UNDER VARIOUS CONDITIONS. TWO SERIES OF SUCCESSFUL OPERATIONS WERE CONDUCTED, INCLUDING VERTICAL AND SHORT TAKE-OFFS AND LANDINGS, CONVERSIONS AND RECONVERSIONS AND HOVER WITH WIND OVER THE DECK FROM APPROXIMATELY 12 TO 37 KNOTS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-601 022
MELPAR INC FALLS CHURCH VA

SIMULATION OF HELICOPTER AND V/STOL AIRCRAFT., VOLUME I: HELICOPTER ANALYSIS REPORT, (U)

SEP 63 325P TOLER,JAMES R. ;MCINTYRE, WALTER ;COFFEE,MERLIN P. ;
CONTRACT: N61339 1205
MONITOR: NAVTRADEVCEN 1205 1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON STUDY, EQUATIONS OF MOTION OF VERTICAL/SHORT TAKEOFF AND LANDING OPERATIONAL FLIGHT/WEAPON SYSTEM TRAINERS.

DESCRIPTORS: (*HELICOPTERS, SIMULATION), (*VERTICAL TAKE-OFF PLANES, SIMULATION), AERODYNAMIC CHARACTERISTICS, MATHEMATICAL MODELS, PROGRAMMING COMPUTERS, ANALOG COMPUTERS, DIGITAL COMPUTERS, MATHEMATICAL ANALYSIS (U)

THE OBJECTIVE OF THE REPORT IS TO PRESENT THE AERODYNAMIC AND DYNAMIC HELICOPTER EQUATIONS SUPPORTED BY DERIVATIONS AND A COMPREHENSIVE DISCUSSION. THE AERODYNAMIC EQUATIONS ARE DEVELOPED THROUGH A MODIFIED BLADE ELEMENT APPROACH ALTHOUGH OTHER ALTERNATIVE TECHNIQUES ARE CONSIDERED. THE EQUATIONS ARE NOT CONSTRAINED TO A GIVEN, OR A NUMBER OF GIVEN, FLIGHT CONDITIONS BUT ARE VALID FOR THE ENTIRE FLIGHT REGIME INCLUDING HOVER, TRANSITION, AUTOROTATION, THE EFFECTS OF VARYING ALTITUDE, GROUND EFFECTS, AND BLADE AEROELASTICITY IN TWIST. THE DYNAMIC DERIVATION DEVELOPS A SET OF UNABRIDGED AND SIMPLIFIED EQUATIONS OF TRANSLATIONAL AND ANGULAR RATES SPECIFICALLY FOR A TANDEMROTOR HELICOPTER. THE DYNAMIC AND AERODYNAMIC EFFECTS ON THE HELICOPTER ROTOR ARE COMBINED TO PRODUCE EQUATIONS TO DESCRIBE BLADE ACCELERATION, VELOCITY, AND POSITION, WHILE FLAPPING, AT CHOSEN POINTS DURING A ROTATION. A TECHNIQUE IS ALSO PRESENTED FOR GREATLY SIMPLIFYING THE SIMULATION OF A TANDEM-ROTOR HELICOPTER WHICH ELIMINATES THE NECESSITY OF CONSTRUCTION DETAILED, IDENTICAL MATHEMATICAL MODELS FOR THE TWO ROTORS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-601 151
CURTISS-WRIGHT CORP CALDWELL N J

AN INVESTIGATION OF THE OVER WATER ASPECTS OF VTOL AIRPLANES AT HIGH DISC LOADING. (U)

DESCRIPTIVE NOTE: FINAL REPT.
DEC 63 53P DYKE,RAYMOND W. ;
REPT. NO. 012 26
CONTRACT: NOW-62-0279

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, DOWNWASH), (*CONVERTIBLE PLANES, MODEL TESTS), HOVERING, WATER, SURFACES, SPRAYS, WATER WAVES, DISKS, LOADING (MECHANICS), SEAPLANE FLOATS, AIR-SEA RESCUES, LIFE RAFTS (U)
IDENTIFIERS: X-19 AIRCRAFT, X-100 AIRCRAFT (U)

TESTS, USING SMALL SCALE MODELS OF THE CURTISS-WRIGHT X-100 AND X-19 AIRCRAFT, HAVE BEEN CARRIED OUT TO INVESTIGATE THE DISTURBANCE AND SPRAY CAUSED BY VTOL AIRCRAFT HOVERING ABOVE WATER. FULL SCALE DISC LOADINGS IN THE RANGE 20 TO 70 LB./SQ.FT. WERE REPRESENTED. CORRELATION OF THE MODEL TEST RESULTS WITH FULL SCALE TESTING OF THE X-100 AIRPLANE OVER WATER AT A DISC LOADING OF 23 LB.SQ.FT. AND HEIGHT OF 21 FEET SHOW EX CELLENT AGREEMENT. DOWNWASH EFFECTS ON OBJECTS FLOATING BELOW THE X-19 MODEL WERE ALSO DEMONSTRATED. SPRAY IS SHOWN TO RISE TO CONSIDERABLE HEIGHTS AT THE HIGHER DISC LOADINGS WITH THE MODELS CLOSE TO THE WATER SURFACE, AND FLOATING OBJECTS MAY BE SUBJECTED TO SEVERE BUFFETING UNDER THESE CONDITIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-601 170
KELLETT AIRCRAFT CORP PHILADELPHIA PA

APPLICATION OF A MECHANICAL GYROSCOPIC STABILIZER TO VTOL AIRCRAFT. (U)

NOV 63 143P
REPT. NO. 220A90 2
CONTRACT: NOW-62-0819

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*GYRO STABILIZERS, VERTICAL TAKE-OFF PLANES), (*VERTICAL TAKE-OFF PLANES, GYRO STABILIZERS), DESIGN, AERODYNAMIC CHARACTERISTICS, PERFORMANCE (ENGINEERING), RELIABILITY, EQUATIONS, DIFFERENTIAL EQUATIONS, MOTION, DAMPING STABILITY (U)

THE APPLICATION OF MECHANICAL GYROSCOPIC STABILIZERS TO VTOL AIRCRAFT HAS BEEN STUDIED FROM DESIGN AND FLYING QUALITIES CONSIDERATIONS. DESIGN OFSTUDIES OF A SINGLE DEGREE OF FREEDOM GYROSCOPIC STABILIZER AND A GYROSCOPIC STABILIZER BAR HAVE BEEN MADE TO DEVISE A RELIABLE, LIGHTWEIGHT, COMPACT AND INEXPENSIVE MECHANICAL STABILIZER. THE SELECTION OF PARAMETERS FOR THE DESIGN OF THE STABILIZERS WAS MADE UTILIZING EXISTING ANALYSIS AND STABILITY DERIVATIVES FOR TWO TILT WING VTOL AIRCRAFT. THE STABILIZER PARAMETER EVALUATION PROCEDURE WAS ESTABLISHED BASED ON THE AVAILABLE FLYING QUALITIES CRITERIA. THE RESULTS OF THIS PROGRAM SHOW THE SINGLE DEGREE OF FREEDOM STABILIZER IS LESS EXPENSIVE, LIGHTER WEIGHT AND IS MORE COMPACT THAN THE STABILIZER BAR. THE SINGLE DEGREE OF FREEDOM STABILIZER WILL WEIGH 20 POUNDS AND WILL OCCUPY ONE HALF A CUBIC FOOT OF VOLUME TO PROVIDE ATTITUDE AND RATE STABILIZATION ABOUT THE PITCH AND ROLL AXES OF VTOL AIRCRAFT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-602 427
MELPAR INC FALLS CHURCH VA

SIMULATION OF HELICOPTER AND V/STOL AIRCRAFT. VOLUME II. V/STOL ANALYSIS REPORT. STUDY, EQUATIONS OF MOTION OF VERTICAL/SHORT TAKE-OFF AND LANDING OPERATIONAL FLIGHT/WEAPON SYSTEM TRAINERS, (U)

SEP 63 119P MCINTYRE,WALTER ;
CONTRACT: N61339 1205
MONITOR: NAVTRADEVCEN 1205-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*HELICOPTERS, FLIGHT SIMULATORS), (*VERTICAL TAKE-OFF PLANES, AERODYNAMIC CONFIGURATIONS), TRAINING DEVICES, SIMULATION, SHORT TAKE-OFF PLANES, AERODYNAMIC CHARACTERISTICS, MATHEMATICAL MODELS, TENSOR ANALYSIS, AIRPLANE LANDINGS, SPECIAL PURPOSE COMPUTERS, NAVAL TRAINING (U)
IDENTIFIERS: V/STOL AIRCRAFT, EQUATIONS OF MOTION (U)

THE REPORT PROMOTES AN UNDERSTANDING OF V/STOL ANALYSIS FOR SIMULATION PURPOSES AND DEVELOPS EQUATIONS OF MOTION COMPATIBLE TO EITHER ANALOGUE OR REAL TIME DIGITAL SOLUTION. A GENERAL SET OF EQUATIONS OF MOTION ARE DEVELOPED IN WHICH AXIS SYSTEMS AND AERODYNAMIC COEFFICIENTS ARE MINIMIZED. EQUATIONS OF MOTION ARE THEN DEVELOPED FOR FIVE DIFFERENT V/STOL AIRCRAFT WHEREIN THE NEED FOR ADDITIONAL AXIS SYSTEMS AND AERODYNAMIC COEFFICIENTS FOR A PARTICULAR V/STOL CONFIGURATION IS DEVELOPED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-607 737
MELPAR INC FALLS CHURCH VA

SIMULATION OF HELICOPTER AND V/STOL AIRCRAFT. VOLUME III, PART I. COMPUTATIONAL METHODS ANALOG. STUDY, EQUATIONS OF MOTION OF VERTICAL/SHORT TAKE-OFF AND LANDING OPERATIONAL FLIGHT/WEAPON SYSTEM TRAINERS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAY 64 230P CASTLE,R. A. ;GRAY,A. L. ;
MCINTYRE,WALTER ;
CONTRACT: N61339 1205
MONITOR: NAVTRADEVCEN , 1205 3

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*HELICOPTERS, SIMULATION); (*VERTICAL TAKE-OFF PLANES, SIMULATION), (*EQUATIONS, MOTION), PROGRAMMING (COMPUTERS), MATHEMATICAL MODELS, ANALOG COMPUTERS, TILT WINGS, SHORT TAKE-OFF PLANES, AIRPLANE LANDINGS, WEAPON SYSTEMS, TRAINING DEVICES, NAVAL TRAINING, AERODYNAMIC CHARACTERISTICS, FLIGHT SIMULATORS (U)

THIS REPORT DEMONSTRATES METHODS OF MECHANIZING THE EQUATIONS OF MOTION OF HELICOPTERS AND V/STOL AIRCRAFT BY THE USE OF ANALOG COMPUTING EQUIPMENT. THE EQUATIONS OF MOTION OF THESE AIRCRAFT ARE PRESENTED IN NAVTRADEVCEN TECHNICAL REPORTS 1205-1, -2 (AD-601 022, AD-602 427), AND THIS REPORT ASSUMES A KNOWLEDGE OF SUCH EQUATIONS BY THE READER. THE REPORT REVIEWS AND DISCUSSES CRITERIA FOR THE SELECTION OF ANALOG COMPUTER TYPE AS 60 CYCLE AND 400 CYCLE, AND CHOICE OF CARRIER, AS WELL AS SPECIFIC COMPUTER COMPONENTS. A HELICOPTER AND A TILT WING V/STOL ARE SELECTED FOR COMPUTER MECHANIZATION AND THE PRESENTATION OF COMPUTER FLOW DIAGRAMS WHICH MAY BE TYPICAL COMPUTER DIAGRAMS USED IN THE ANALOG SIMULATION OF SUCH AIRCRAFT ARE DISCUSSED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-601 738
MELPAR INC FALLS CHURCH VA

SIMULATION OF HELICOPTER AND V/STOL AIRCRAFT. VOLUME III, PART II. COMPUTATIONAL METHODS DIGITAL. STUDY, EQUATIONS OF MOTION OF VERTICAL/SHORT TAKE-OFF AND LANDING OPERATIONAL FLIGHT/WEAPON SYSTEM TRAINERS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
AUG 63 120P TREGUB,BURTON G. ;COFFEE,
MERLIN P. ;RUSSELL,C. E.;
CONTRACT: N61339 1205
MONITOR: NAVTRADEVCEN , 1205 3

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-601 022, AD-602 427.

DESCRIPTORS: (*HELICOPTERS, SIMULATION), (*VERTICAL TAKE-OFF PLANES, SIMULATION), (*EQUATIONS, MOTION), PROGRAMMING (COMPUTERS), MATHEMATICAL MODELS, DIGITAL COMPUTERS, TILT WINGS, SHORT TAKE-OFF PLANES, AIRPLANE LANDINGS, WEAPON SYSTEMS, TRAINING DEVICES, NAVAL TRAINING, AERODYNAMIC CHARACTERISTICS, FLIGHT SIMULATORS (U)

THIS REPORT WAS WRITTEN WITH THE PURPOSE OF DEMONSTRATING THE METHODS OF MECHANIZING THE EQUATIONS OF MOTION OF HELICOPTERS AND V/STOL AIRCRAFT BY DIGITAL COMPUTING EQUIPMENT. THE REPORT IS BASED ON THE MECHANIZATION OF THE FINAL EQUATIONS DEVELOPED IN VOLUMES I AND II OF THIS REPORT AND ASSUMES A KNOWLEDGE OF THEM. A GENERAL TREATMENT OF MATHEMATICAL METHODS OF ANALYSIS AND OF DIGITAL COMPUTER TECHNIQUES IS PRESENTED. THE MATHEMATICAL MODELS DEVELOPED IN VOLUMES I AND II FOR HELICOPTERS, BOTH SINGLE AND TANDEM ROTOR, AND FOR V/STOL AIRCRAFT ARE PRESENTED IN A DIGITALLY APPLICABLE FORM. RECOMMENDATIONS ARE GIVEN FOR COMPUTER MEMORY SIZE AND FOR COMPUTER SOPHISTICATION BASED ON THE FINDINGS OF THE STUDY REPORTED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-608 185
DYNASCIENCES CORP FORT WASHINGTON PA

DOWNWASH IMPINGEMENT DESIGN CRITERIA FOR VTOL AIRCRAFT. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. FOR JUL 63-MAR 64, AUG 64 137P GEORGE,M. M. ;PERLMUTTER,A. A. ; BUTLER,L. J. ;
REPT. NO. DCR-139
CONTRACT: DA44 177AMC65T
TASK: 1D121401A14129
MONITOR: TRECOM , TR64 48

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, DESIGN), (*DOWNWASH, VERTICAL TAKE-OFF PLANES), TERRAIN, PARTICLES, INHIBITION, VISION, PILOTS, DAMAGE, JETS, PERFORMANCE (ENGINEERING), AVIATION ACCIDENTS, PROPELLERS (AERIAL), PRESSURE (U)

THE OBJECTIVE OF THE PROGRAM WAS TO UTILIZE EXISTING DATA FOR THE PREPARATION OF DESIGN CHARTS FOR VTOL AIRCRAFT TO AID IN THE ESTABLISHMENT OF AIRCRAFT DESIGNS THAT WILL ALLEVIATE THE ADVERSE OPERATIONAL CONDITIONS RESULTING FROM DOWNWASH IMPINGEMENT ON TERRAIN. SPECIFIC AREAS OF INVESTIGATION INCLUDED PARTICLE ENTRAINMENT AND INGESTION AND THEIR EFFECT ON PILOT VISION, AIRCRAFT DAMAGE, PERSONNEL INJURY, AND AIRCRAFT SIGNATURE. METHODS TO QUANTITATIVELY PREDICT OPERATIONAL CONDITIONS RESULTING FROM DOWNWASH IMPINGEMENT OF A VTOL AIRCRAFT ARE PRESENTED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-610 634
CORNELL AERONAUTICAL LAB INC BUFFALO N Y

THEORETICAL AND EXPERIMENTAL STUDIES OF IMPINGING UNIFORM AND NONUNIFORM JETS, (U)

AUG 64 102P BRADY,W. GORDON ;LUDWIG,GARY R. ;
REPT. NO. CAL-TG-1818-S-1
CONTRACT: DA44 177AMC18T
TASK: 1D121401A14129
MONITOR: TRECOM , TR64 42

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: CONTINUATION OF CONTRACT DA44 177TC782. SEE ALSO AD-408 669.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, DOWNWASH), (*JETS, FLUID FLOW), IMPELLERS, DUCTED FANS, BOUNDARY LAYER, VELOCITY, EXHAUST NOZZLES, BOUNDARY LAYER TRANSITIONS, MATHEMATICAL ANALYSIS, EXPERIMENTAL DATA, MATHEMATICAL MODELS, THEORY, VORTICES, ITERATIVE METHODS, AERODYNAMIC CHARACTERISTICS (U)
IDENTIFIERS: IBM 704 (U)

THE RESULTS OF AN EXPERIMENTAL INVESTIGATION OF THE FLOW UNDER A NORMALLY IMPINGING NONUNIFORM JET ARE PRESENTED. THE JET VELOCITY PROFILE WAS DESIGNED TO BE REPRESENTATIVE OF ROTORS AND DUCTED FANS. THE JET WAS TESTED AT DISTANCES FROM THE GROUND OF 4, 2, AND 1/2 NOZZLE DIAMETERS. AN APPROXIMATE ANALYSIS WHICH USES AN EMPIRICAL RELATION FOR RADIAL MASS FLOW NEAR THE GROUND IS USED TO CALCULATE THE PROPERTIES OF THE FLOW ALONG THE GROUND AT RADII LARGE ENOUGH SO THAT THE PRESSURE GRADIENT IS APPROXIMATELY ZERO. A METHOD OF CALCULATING THE PROPERTIES OF THE FLOW IN AN INVISCID, NORMALLY IMPINGING, UNIFORM JET HAS BEEN FORMULATED. THE FORMULATION IS APPLICABLE FOR ALL DISTANCES BETWEEN THE JET NOZZLE AND THE GROUND. SOLUTIONS HAVE BEEN OBTAINED FOR JETS AT NOZZLE-TO-GROUND DISTANCES OF 1/4 AND 1 JET DIAMETERS. THE MATHEMATICAL MODEL USED WAS BASED ON A VORTEX-SHEET REPRESENTATION, AND SOLUTIONS WERE OBTAINED BY MEANS OF AN ITERATIVE TECHNIQUE USING AN IBM 704 DIGITAL COMPUTER. GOOD AGREEMENT WAS OBTAINED WITH EXPERIMENTAL GROUND-PLANE AND JET-CENTERLINE PRESSURE DISTRIBUTIONS, AND WITH NOZZLE-EXIT VELOCITY PROFILES. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-612 927
LING-TEMCO-VOUGHT INC DALLAS TEX LTV VOUGHT AERONAUTICS DIV

DATA REPORT FOR LTV LOW SPEED WIND TUNNEL TEST NUMBER 172, TEST OF HIGH MASS RATE VECTORED PROPULSION FLOW MODEL, (U)

FEB 65 198P MERTAUGH,L. J. ,JR.;
REPT. NO. 2-53310/5R-2172
CONTRACT: DA31 124ARO D262
PROJ: 5260E
MONITOR: AROD , 5260:3

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: AVAILABLE COPY WILL NOT PERMIT FULLY LEGIBLE REPRODUCTION. REPRODUCTION WILL BE MADE IF REQUESTED BY USERS OF DDC. A COPY IS AVAILABLE FOR PUBLIC SALE.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, WIND TUNNEL MODELS), (*WIND TUNNEL MODELS, VERTICAL TAKE-OFF PLANES), WIND TUNNELS, TESTS, DATA, LIFT, ROLL, PITCH MOTION, DRAG, ANGLE OF ATTACK, AERODYNAMIC CHARACTERISTICS, AERODYNAMIC CONFIGURATIONS, AERODYNAMIC LOADING, THRUST VECTOR CONTROL SYSTEMS, PROPULSION, GAS FLOW (U)

THE WIND TUNNEL DATA RESULTING FROM A LOW SPEED WIND TUNNEL TEST OF A SEMI-SPAN MODEL OF A CLOSE SUPPORT, VTOL AIRCRAFT IS PRESENTED. THE MODEL FEATURES AN INTEGRATED PROPULSION/LIFTING SURFACE SYSTEM AS WELL AS VERTICAL AND HORIZONTAL TAILS LOCATED ON AN AFT, WING TIP EXTENSION. THE PROPULSION SYSTEM EXHAUST FLOW, WHICH IS SIMULATED WITH COLD AIR, EXHAUSTS OVER THE WING TRAILING EDGE FLAP (FLAP JET) AND OUT OF THE LOWER SURFACE OF THE WING (WING BOX JET). THE EXHAUST FLOWS CAN BE INDEPENDENTLY VECTORED THROUGH 90 DEGREES WITH RESPECT TO THE WING CHORD PLANE. THE TEST DATA ARE PRESENTED IN THE FORM OF LIFT AND ROLLING MOMENT COEFFICIENTS AS FUNCTIONS OF ANGLE OF ATTACK, AND DRAG AND PITCH MOMENT COEFFICIENTS AS FUNCTIONS OF LIFT COEFFICIENT. THE COEFFICIENT DATA ARE GIVEN WITH AND WITHOUT THE DIRECT THRUST CONTRIBUTION INCLUDED. THE STATIC THRUST DATA ARE GIVEN IN THE FORM OF LIFT, DRAG, PITCHING MOMENT AND ROLLING MOMENT AS FUNCTIONS OF ANGLE OF ATTACK. NO ANALYSIS OF THE DATA IS PRESENTED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-613 198
LING-TEMCO-VOUGHT INC DALLAS TEX LTV VOUGHT AERONAUTICS DIV

ANALYSIS OF A LOW SPEED WIND TUNNEL TEST OF A HIGH MASS RATE VECTORED PROPULSION FLOW MODEL. (U)

FEB 65 97P STANCIL,R. T. ;MERTAUGH,L. J. , JR.;

REPT. NO. 2-53310/4R-2166
CONTRACT: DA31 124ARO D262
PROJ: 5260E
MONITOR: AROD , 5260:2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE; AVAILABLE COPY WILL NOT PERMIT FULLY LEGIBLE REPRODUCTION. REPRODUCTION WILL BE MADE IF REQUESTED BY USERS OF DDC. A COPY IS AVAILABLE FOR PUBLIC SALE.

DESCRIPTORS: (*WIND TUNNEL MODELS, VERTICAL TAKE-OFF PLANES), (*VERTICAL TAKE-OFF PLANES, WIND TUNNEL MODELS), AERODYNAMIC CONFIGURATIONS, LIFT, DRAG, THRUST, FORCE (MECHANICS), FLOW VISUALIZATION, EXHAUST GASES, PROPULSION, WINGS, JET FLAPS, TAILS (AIRCRAFT), MODEL TESTS, GRAPHICS (U)

AN ANALYSIS OF SELECTED PORTIONS OF THE DATA RESULTING FROM A LOW SPEED WIND TUNNEL TEST OF A SEMI-SPAN MODEL OF A VTOL AIRCRAFT IS PRESENTED. THE MODEL FEATURES AN INTEGRATED PROPULSION/LIFTING SURFACE SYSTEM AS WELL AS A HORIZONTAL TAIL LOCATED ON AN AFT, WING TIP EXTENSION. THE PROPULSION SYSTEM FLOW, SIMULATED WITH COLD AIR, EXHAUSTS OVER THE WING TRAILING EDGE FLAP (FLAP JET) AND OUT OF THE LOWER SURFACE OF THE WING (WING BOX JET). THE EXHAUST FLOWS CAN BE INDEPENDENTLY VECTORED THROUGH 90 DEGREES. FORCE AND MOMENT DATA ARE PRESENTED FOR BOTH STATIC AND FORWARD FLIGHT CONDITIONS. SOME COMPARISON WITH THEORETICAL PREDICTIONS ARE PRESENTED. PORTIONS OF THE DATA ARE SHOWN WITH THE DIRECT THRUST COMPONENTS REMOVED. THE RESULTS OF THIS ANALYSIS SHOW THAT: (1) THE OUTBOARD LOCATION OF THE HORIZONTAL TAIL PROVIDES A REDUCTION IN AIRPLANE INDUCED DRAG, (2) A SIGNIFICANT PORTION OF THE THEORETICAL JET FLAP EFFECT IS OBTAINED WITH THE WING BOX JET DIRECTED PARALLEL TO THE WING CHORD PLANE, (3) A REDUCED JET FLAP EFFECT IS AVAILABLE WITH DEFLECTIONS OF THE WING BOX JET AWAY FROM THE WING CHORD PLANE. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-616 650
UNITED AIRCRAFT CORP NORWALK CONN NORDEN DIV

UNIVERSAL CONTACT ANALOG DISPLAY (UCAD) RESEARCH, PHASE I. SYSTEMS ANALYSIS, (U)

DESCRIPTIVE NOTE: TECHNICAL PROGRESS REPT.,
APR 65 112P WILLIAMS,PETER ;
REPT. NO. 1161-R-0011
CONTRACT: NONR4488(00)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*FLIGHT INSTRUMENTS, SPECIFICATIONS), (*VERTICAL TAKE-OFF PLANES, FLIGHT INSTRUMENTS), (*TELEVISION DISPLAY SYSTEMS, FLIGHT INSTRUMENTS), DESIGN, SYSTEMS ENGINEERING, ANALOG SYSTEMS, SONAR, CARRIER LANDINGS, HOVERING, ROTARY WINGS (U)

THE RESULTS ARE PRESENTED OF THE SYSTEMS ANALYSIS PHASE OF THE UNIVERSAL CONTACT ANALOG DISPLAY (UCAD) RESEARCH PROGRAM, INITIATED IN JUNE 1964. THE GOAL OF THIS RESEARCH IS THE DEVELOPMENT OF DESIGN SPECIFICATIONS FOR A UNIVERSAL RASTER-SCAN TV FLIGHT INSTRUMENT SUITABLE FOR USE IN FIXED-WING, ROTARY-WING, AND VTOL AIRCRAFT. INFORMATION PARAMETERS WERE IDENTIFIED AND QUANTIFIED BY MEANS OF A SYSTEMATIC ANALYSIS OF AIRCRAFT PERFORMANCE AND FLIGHT INFORMATION REQUIREMENTS. MISSION SEGMENTS, CONSISTING OF COMMON FLIGHT MANEUVERS, WERE DEFINED AS A RESULT OF MISSION ANALYSES. LOOP DIAGRAMS ARE CONFIGURED FOR FIXED- AND ROTARY-WING AIRCRAFT INCORPORATING LINEAR TRANSFER FUNCTIONS. AIRCRAFT RESPONSE CRITERIA ARE DEVELOPED BASED ON A COMBINATION OF MILITARY HANDLING QUALITY SPECIFICATIONS AND PILOT OPINION REPORTS. DISPLAY AUGMENTATION REQUIREMENTS WERE SPECIFIED. TOTAL DISPLAY INFORMATION REQUIREMENTS FOR FLIGHT CONTROL, PROPULSION SYSTEMS, AND SPECIAL MISSION PARAMETERS WERE ESTABLISHED. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-620 442
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF AERONAUTICS AND ASTRONAUTICS

LOW SPEED AERODYNAMIC CHARACTERISTICS OF JET VTOL AIRCRAFT AT ANGLES OF ATTACK. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
MAY 65 90P KUTYNA,DONALD JOSEPH ;
CONTRACT: AF33 608 1081

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, AERODYNAMIC CHARACTERISTICS), SUBSONIC CHARACTERISTICS, ANGLE OF ATTACK, PITCH(MOTION), MOMENTS, WIND TUNNELS, MODEL TESTS, EXPERIMENTAL DATA (U)

A VTOL MODEL INCORPORATING A LIFTING FAN MOUNTED VERTICALLY IN THE FUSELAGE WAS TESTED IN THE M. I. T. WRIGHT BROTHERS WIND TUNNEL TO EXAMINE THE VARIATIONS OF THE PITCHING MOMENT AND LONGITUDINAL FORCES WITH CHANGES IN THE ANGLE OF ATTACK AND FORWARD VELOCITY. THE MODEL WAS TESTED AT ANGLES OF ATTACK BETWEEN ±90 DEGREES, BUT THE RESULTS WERE CONSIDERED RELIABLE ONLY UP TO +45 DEGREES DUE TO STALLING OF THE MODEL FAN BLADES. MOMENT WAS FOUND TO BE UNSTABLE BETWEEN THE MEASURED ANGLES OF ATTACK FROM -45 DEGREES TO +10 DEGREES, INCREASING MODERATELY AS ANGLE OF ATTACK INCREASED. AN INCREASE IN THE RATIO OF FORWARD VELOCITY TO FAN EFFLUX VELOCITY ALSO PRODUCED AN INCREASED MOMENT. A THEORY DEVELOPED BY A. R. KRIEBEL BASED UPON A FOURIER ANALYSIS OF THE VORTEX DISTRIBUTION ON A THIN CYLINDRICAL DUCTED FAN WAS EMPLOYED TO PREDICT THE RESULTS OF THE EXPERIMENT. CONSIDERING THE SIMPLIFYING ASSUMPTIONS USED IN THE THEORY, THE CORRELATION WAS FOUND TO BE REASONABLY GOOD EXCEPT AT HIGH RATIOS OF FREE STREAM TO FAN EFFLUX VELOCITY. AT THESE RATIOS, AN UNCOMPENSATED FOR LOW PRESSURE AREA AFT OF THE EXHAUST DUCT RESULTED IN CONSIDERABLY ERRONEOUS PREDICTIONS. THRUST GENERALLY INCREASED WITH ANGLE OF ATTACK AND VARIED WITH THE VELOCITY RATIO, THE VARIATION BEING RELATED TO THE SIGN OF THE ANGLE OF ATTACK. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-621 578
LING-TEMCO-VOUGHT INC DALLAS TEX LTV VOUGHT AERONAUTICS DIV

LTV LOW SPEED WIND TUNNEL TEST NUMBER 190, FOLLOW-ON TEST OF HIGH MASS RATE VECTORED PROPULSION FLOW MODEL. (U)

DESCRIPTIVE NOTE: DATA REPT.,
JUL 65 200P DAVIDSON,J. K. ;
REPT. NO. 2-53310/5R-2217
CONTRACT: DA31 124ARO D262
PROJ: ARO D262DE
MONITOR: AROD , 5260:5

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AVAILABILITY: MICROFICHE ONLY AFTER ORIGINAL COPIES EXHAUSTED.
SUPPLEMENTARY NOTE: AVAILABLE ONLY FOR REFERENCE USE AT DDC FIELD SERVICES. COPY IS NOT AVAILABLE FOR PUBLIC SALE.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, MODEL TESTS), (*PROPULSION, VERTICAL TAKE-OFF PLANES), THRUST, LIFT, PITCH(MOTION), WIND TUNNEL MODELS, TAILS(AIRCRAFT), TRAILING CONTROL SURFACES, ROLL, DRAG, ANGLE OF ATTACK, THRUST VECTOR CONTROL SYSTEMS, GRAPHICS (U)

THE WIND TUNNEL DATA RESULTING FROM A LOW SPEED WIND TUNNEL FOLLOW-ON TEST OF A SEMI-SPAN MODEL OF A CLOSE SUPPORT, VTOL AIRCRAFT IS PRESENTED. THE MODEL FEATURES AN INTEGRATED PROPULSION/LIFTING SURFACE SYSTEM AS WELL AS VERTICAL AND HORIZONTAL TAILS LOCATED ON AN AFT, WING TIP EXTENSION. THE PROPULSION SYSTEM EXHAUST FLOW, WHICH IS SIMULATED WITH COLD AIR, EXHAUSTS OVER THE WING TRAILING EDGE FLAP (FLAP JET) AND OUT OF THE LOWER SURFACE OF THE WING (WING BOX JET). THE EXHAUST FLOWS CAN BE INDEPENDENTLY VECTORED THROUGH 90 DEGREES WITH RESPECT TO THE WING CHORD PLANE. THE TEST DATA ARE PRESENTED IN THE FORM OF LIFT AND ROLLING MOMENT COEFFICIENTS AS FUNCTIONS OF ANGLE OF ATTACK, AND DRAG AND PITCH MOMENT COEFFICIENTS AS FUNCTIONS OF LIFT COEFFICIENT. THE COEFFICIENT DATA ARE GIVEN WITH AND WITHOUT THE DIRECT THRUST CONTRIBUTION INCLUDED. THE STATIC THRUST DATA ARE GIVEN IN THE FORM OF LIFT, DRAG, PITCHING MOMENT AND ROLLING MOMENT AS FUNCTIONS OF ANGLE OF ATTACK. TEST DATA WITH AND WITHOUT GROUND BOARD EFFECTS ARE PRESENTED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-621 684
HUGHES TOOL CO CULVER CITY CALIF AIRCRAFT DIV

AIRCRAFT DESIGN XV-9A HOT CYCLE RESEARCH AIRCRAFT. (U)

DESCRIPTIVE NOTE: FINAL SUMMARY REPT. FOR 28 SEP 62-15 MAR 65,
AUG 65 326P HIRSH,NORMAN B. ;
REPT. NO. HTC-AD-64-11 (385-X-05)
CONTRACT: DA44 177AMC877T
TASK: 1M121401A14403
MONITOR: USAAVLABS , TR-65-29

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-613 339.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, ROTARY WINGS), DESIGN, GAS GENERATOR ENGINES, JET PROPULSION, ROTOR BLADES(ROTARY WINGS), AERODYNAMIC CONFIGURATION, WEIGHT, PAYLOAD, FLIGHT CONTROL SYSTEMS, HOVERING, LEVEL FLIGHT, STABILITY, AERODYNAMIC LOADING, AERODYNAMIC CHARACTERISTICS, PERFORMANCE(ENGINEERING) (U)
IDENTIFIERS: XV-9A AIRCRAFT, YT-64 GAS GENERATOR (U)

A SUMMARY OF THE DESIGN OF THE XV-9A HOT CYCLE RESEARCH AIRCRAFT IS PRESENTED. A DISCUSSION OF THE CONCEPTS UTILIZED IN DESIGN AND ADDITIONAL INFORMATION RELATING TO CONFIGURATION, WEIGHT AND BALANCE, PERFORMANCE, STABILITY AND CONTROL, DYNAMICS, AND STRUCTURAL CHARACTERISTICS ARE PRESENTED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM0/

AD-622 205
NAVAL POSTGRADUATE SCHOOL MONTEREY CALIF

A QUALITATIVE DISCUSSION OF THE STABILITY AND CONTROL OF VTOL AIRCRAFT DURING HOVER (OUT OF GROUND EFFECT) AND TRANSITION. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
64 70P MEITZ,PAUL J. ;

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, HOVERING), STABILITY, CONTROL, DAMPING, AILERONS, YAW, DEFLECTION, DUCTED FANS, PROPELLERS(AERIAL), PITCH(MOTION), JET PLANES, TURBOJET ENGINES, THRUST, RESEARCH PLANES (U)
IDENTIFIERS: THESES (U)

A SURVEY OF THE LATEST AVAILABLE LITERATURE WAS MADE IN ORDER TO QUALITATIVELY DISCUSS STABILITY AND CONTROL PROBLEMS OF VERTICAL TAKEOFF AND LANDING (VTOL) AIRCRAFT DURING HOVER (OUT OF GROUND EFFECT) AND THE TRANSITION TO LEVEL FLIGHT. MODES OF PROPULSION AND METHODS OF PERFORMING THE TRANSITION MANEUVER ARE DISCUSSED. COMPARISONS ARE MADE OF THE VARIOUS METHODS UTILIZED FOR PROVIDING CONTROL FORCES AT ZERO AND VERY LOW SPEEDS. THE NEED FOR QUANTITATIVE CONTROL POWER REQUIREMENTS AND HANDLING QUALITIES CRITERIA IS PRESENTED. THE INSTABILITY OF VTOL AIRCRAFT WHILE HOVERING IS DISCUSSED, AS ARE THE BASIC REASONS FOR THE POOR DAMPING CHARACTERISTICS AT LOW SPEEDS. PROBLEMS WHICH HAVE BEEN ENCOUNTERED TO DATE WITH RESEARCH AIRCRAFT AND WHICH ARE PECULIAR TO A GIVEN VTOL MODE ARE DISCUSSED BY MODE. THE NEED FOR AUTOMATIC STABILIZATION AND PRECISION INSTRUMENTATION REQUIREMENTS ARE PRESENTED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-624 578
LOCKHEED-CALIFORNIA CO BURBANK

STUDY OF SIZE EFFECTS ON VTOL HANDLING QUALITIES CRITERIA, (U)

SEP 65 97P JOHNSTON,J. FORD ;CULVER, IRVEN H. ;FRIEND,CARL F. ;
REPT. NO. LR-18408
CONTRACT: DA44 177AMC236T
TASK: 1P121401A14178
MONITOR: USAAVLABS , TR-65-24

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, CONTROL), DESIGN, DYNAMICS, FLIGHT, JET PLANES, HELICOPTERS, YAW, PITCH(MOTION), ROLL, STABILITY, HOVERING, HUMAN ENGINEERING, DAMPING (U)

A FUNDAMENTAL STUDY IS PRESENTED OF THE EFFECTS OF VEHICLE SIZE ON HANDLING QUALITIES OF JET AND HELICOPTER-TYPE VTOL AIRCRAFT AT HOVER AND LOW SPEEDS, SIZE BEING DEFINED BY THE CHARACTERISTIC LINEAR DIMENSION. THE EFFECTS OF SIZE ON VEHICLE HANDLING QUALITIES CAPABILITY AND PILOT-VEHICLE COMPATIBILITY ARE DEVELOPED. CONSIDERATION IS GIVEN TO THE PILOT AS AN ADAPTIVE NONLINEAR SERVO. THE STUDY INDICATES: (1) CONTROL POWER/ INERTIA AND DAMPING/INERTIA TEND TO DECREASE WITH SIZE. (2) EXCEPT FOR TAIL ROTOR HELICOPTERS IN YAW, FINAL ANGULAR RATES ARE RELATIVELY INVARIANT WITH SIZE. (3) CHARACTERISTIC TIME TO REACH FINAL ANGULAR RATE INCREASES WITH SIZE. (4) LINEAR ACCELERATIONS AND MOTIONS ARE NEARLY INVARIANT WITH SIZE. (5) EFFECTS OF EXTERNAL DISTURBANCES AND TRIM CHANGES WITH SPEED ON JET VTOL VEHICLES DECREASE AT LEAST AS RAPIDLY AS CONTROL POWER/ INERTIA. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-623 100
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING

EFFECTS OF WEIGHT, INERTIA, AND VELOCITY ON CONTROL POWER REQUIREMENTS FOR VTOL AIRCRAFT. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
AUG 65 71P ROMINE,BYRON HARL ;
REPT. NO. GE/EE/65-20

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, STABILIZATION SYSTEMS), (*STABILIZATION SYSTEMS, POWER), STABILITY, CONTROL SYSTEMS, WEIGHT, VELOCITY, ROLL, AILERONS (U)
IDENTIFIERS: VZ-4 AIRCRAFT (U)

THE PILOT-VEHICLE SYSTEMS ANALYSIS IS APPLIED TO THE PROBLEM OF DETERMINING THE EFFECTS OF GROSS WEIGHT, INERTIA, AND VELOCITY ON THE STABILIZATION CONTROL POWER REQUIREMENTS FOR THE SINGLE-LOOP ROLL CONTROL SYSTEM OF A DOAK VZ-4 VTOL AIRCRAFT. THE AIRCRAFT IS SUBJECTED TO RANDOM ROLL INPUTS IN THE FORM OF ATMOSPHERIC DISTRUBANCES. ONLY THE CONTROL POWER REQUIRED TO STABILIZE THE AIRCRAFT ROLL ANGLE BY THE PILOT'S USE OF AILERONS ALONE IS CONSIDERED. THE OPEN-LOOP GAIN OF THE SYSTEM IS DETERMINED BY MAXIMIZING THE CLOSED-LOOP DAMPING RATIO. THERE ARE NO SIGNIFICANT DIFFERENCES IN THE STABILIZATION CONTROL POWER REQUIREMENTS AT THE GROSS WEIGHT CONDITIONS ANALYZED. INCREASED MOMENTS OF INERTIA DO NOT DRIVE THE SYSTEM UNSTABLE, BUT THE CONTROL POWER REQUIREMENTS DECREASE BY ABOUT SIXTY PER CENT AS THE MOMENTS OF INERTIA ARE INCREASED FROM 2800 SLUGSQ FT TO 3300 SLUG-SQ FT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-623 514
ARMY AVIATION TEST ACTIVITY EDWARDS AFB CALIF

PRELIMINARY PILOT QUALITATIVE EVALUATION OF THE XV-5A RESEARCH AIRCRAFT. (U)

DESCRIPTIVE NOTE: LETTER REPT.
OCT 65 48P

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FLIGHT TESTING), FLIGHT CONTROL SYSTEMS, RESEARCH PLANES, TURBOJET ENGINES, LANDINGS, OPERATION, STABILITY, FANS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE PRIMARY OBJOBJECTIVE OF THE TESTS WAS TO INVESTIGATE THOSE AIRCRAFT CHARACTERISTICS DIRECTLY INFLUENCED BY THE LIFT-FAN CONCEPT. THE REPORT CONTAINS THE RESULTS OF THE PRELIMINARY PILOT EVALUATION OF THE XV-5A AIRCRAFT DURING THE STABILITY AND CONTROL PORTION OF THE U. S. ARMY FLIGHT TEST PROGRAM. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-623 527
VTOL SYSTEMS DIV CURTISS-WRIGHT CORP CALDWELL N J

A THEORY FOR VTOL PROPELLER OPERATION IN A STATIC CONDITION. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR JUN 64-MAY 65, OCT 65 85P ERICKSON,JOHN C. ,JR.; LADDEN,RICHARD M. ;BORST,HENRY V.;ORDWAY, DONALD E. ;
CONTRACT: DA44 177AMC165T
PROJ: 1M121401D14415
MONITOR: USAAVLABS , TR-65-69

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SUBCONTRACTED TO THERM ADVANCED RESEARCH, INC., ITHACA, N. Y.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, PROPELLERS(AERIAL)), (*PROPELLERS(AERIAL), PERFORMANCE(ENGINEERING)), LIFT, VORTICES, WAKE, STATICS, THEORY, DEFORMATION, PROGRAMMING(COMPUTERS), MATHEMATICAL ANALYSIS (U)

A GENERAL THEORY FOR PERFORMANCE CALCULATIONS WAS FORMULATED BASED ON A CONTINUOUS VORTEX REPRESENTATION ALONG THE LINES OF THE CLASSICAL LIFTING-LINE MODEL. AS OPPOSED TO FORWARD FLIGHT, THE DEFORMATION OF THE WAKE IS APPRECIABLE JUST BEHIND THE PROPELLER, AND ITS DETERMINATION CONSTITUTES THE HEART OF THE STATIC PROBLEM. A COMPUTER PROGRAM HAS BEEN DEVELOPED TO CALCULATE BOTH THE INFLOW AT THE PROPELLER AND THE INDUCED VELOCITY AT ANY FIELD POINT FOR AN ARBITRARY DESCRIPTION OF THE TRAILING VORTEX SHEETS. TO APPROXIMATE THE FORCE-FREE CONDITION IMPOSED ON THE WAKE, AN INITIAL WAKE HYPOTHESIS DERIVED FROM THE THEORY OF THE GENERALIZED ACTUATOR DISK WAS FIRST USED. THE RESULTING COMPARISONS WITH BOTH DETAILED AND GROSS MEASUREMENTS WERE UNSATISFACTORY AND A REFINED HYPOTHESIS WAS DERIVED. THE REFINED WAKE HYPOTHESIS PROVIDES A MORE REASONABLE REPRESENTATION OF THE 'PITCH' OF THE ELEMENTS OF THE DEFORMED TRAILING VORTEX SHEETS AS WELL AS THE ENVELOPE OF THEIR TRAJECTORIES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-626 617 1/5
REPUBLIC AVIATION CORP FARMINGDALE N Y

FEASIBILITY STUDY ON THE DESIGN AND DEVELOPMENT OF A VTOL BLAST CONTROLLING PLATFORM. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
AUG 65 87P BARTHA,S. ;RINGLER,F. H. ;
REPT. NO. C-6091-05
CONTRACT: DA-22-079-ENG-435
PROJ: DA-1-D021701A047
MONITOR: AEWES , 3-123

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, LANDING MATS), (*LANDING MATS, VERTICAL TAKE-OFF PLANES), (*EXHAUST, DEFLECTION), MODEL TESTS, FEASIBILITY STUDIES, DESIGN, AIRCRAFT ENGINES, JET ENGINES (U)

A CONCEPT WAS DEVELOPED FOR A PORTABLE VERTICAL TAKE-OFF AND LANDING BLAST DIVERTING PLATFORM WHICH WOULD DIRECT THE EXHAUST BLAST AWAY FROM THE AIRCRAFT AND INTO THE AIR TO PREVENT TERRAIN EROSION, HOT GAS REINGESTION, GROUND EFFECTS, AND SIGNATURE. THE PLATFORM WOULD BE ASSEMBLED ON SITE FROM MODULAR SECTIONS, EACH SECTION CONTAINING DEFLECTOR VANES AND TOPPED BY A LOAD BEARING GRID. THE FEASIBILITY OF THIS CONCEPT HAS BEEN DEMONSTRATED BY SCALE MODEL TESTING. THE RESULTS INDICATE THAT SUCH A PLATFORM IS EFFICIENT IN CONDUCTING ENGINE EXHAUST BLAST AND ACCOMPANYING ENTRAINED AIR WAY FROM THE AIRCRAFT. SIGNIFICANT REDUCTION IN THRUST LOSS AND LOWER SURFACE TEMPERATURE ON THE AIRCRAFT MODEL WERE OBSERVED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-627 361 1/3
HUGHES TOOL CO CULVER CITY CALIF AIRCRAFT DIV

COMPONENT TESTING XV-9A HOT CYCLE RESEARCH AIRCRAFT. (U)

DESCRIPTIVE NOTE: SUMMARY REPT. 29 SEP 62-15 MAR 65, NOV 65 199P DEVEAUX,G. D. ;
REPT. NO. HTC-AD-64-26 (385-T-16)
CONTRACT: DA-44-177-AMC-877(T)
TASK: 1M;21401D14403
MONITOR: USAAVLABS , TR-65-38

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-621 684.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, ROTOR BLADES(ROTARY WINGS)), (*ROTOR BLADES(ROTARY WINGS), TESTS), JET HELICOPTER ROTORS, FATIGUE(MECHANICS), ROTARY WINGS, FREQUENCY, JOINTS, RESEARCH PLANES (U)
IDENTIFIERS: V-9 AIRCRAFT (U)

THE COMPONENT TESTS INCLUDED FATIGUE TESTS OF THE BLADE ROOT-END AND CONSTANT SECTION AREAS, HUB GIMBAL SYSTEM, SPAR-TO-SEGMENT AND ROOT-FITTING-TO-SPAR ATTACHMENTS, AND MATERIAL EVALUATION TESTS OF THE BLADE SPARS. SEALING TESTS WERE CONDUCTED ON THE JOINT BETWEEN THE Y-DUCT AND TRIDUCT IN THE HUB AREA, THE JOINT AREA BETWEEN THE GAS GENERATOR AND DIVERTER VALVE, AND THE FIXED-DUCT JOINT ON THE ROTOR BLADE. BLADE NATURAL FREQUENCY TESTS WERE CONDUCTED TO ENSURE THAT THE NATURAL FREQUENCIES OF THE ROTOR BLADE WOULD NOT BE IN A CRITICAL FREQUENCY RANGE. THE INSTRUMENTED FLIGHT BLADE WAS CALIBRATED IN A TEST FIXTURE BEFORE THE FLIGHT TEST PROGRAM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-627 370 1/2
PRINCETON UNIV N J DEPT OF AEROSPACE AND MECHANICAL SCIENCES

AN ANALYTICAL STUDY OF THE DYNAMICS OF AIRCRAFT IN UNSTEADY FLIGHT, (U)

OCT 65 234P CURTISS,H. C. ,JR.;
REPT. NO. AEROSPACE/MECHANICAL SCI-709
CONTRACT: DA-44-177-AMC-8(T)
TASK: 1D121401A14203
MONITOR: USAAVLABS , TR-65-48

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*AIRCRAFT, AERODYNAMICS), (*VERTICAL TAKE-OFF PLANES, AERODYNAMICS), FLIGHT, DIFFERENTIAL EQUATIONS, DYNAMICS, STABILITY (U)

THE DYNAMIC RESPONSE OF CONVENTIONAL AND VTOL AIRCRAFT WITH VARYING FLIGHT VELOCITY IS INVESTIGATED. IT IS ASSUMED THAT THE DYNAMIC MOTIONS OF AIRCRAFT MAY BE DESCRIBED BY LINEAR DIFFERENTIAL EQUATIONS WHOSE COEFFICIENTS (STABILITY DERIVATIVES) ARE FUNCTIONS OF FLIGHT VELOCITY, AND THEREFORE VARY WITH TIME. PRIMARY EMPHASIS IS PLACED ON THE EVALUATION OF THE GENERAL NATURE OF THE VEHICLE RESPONSE AND ITS DEPARTURE FROM FROZEN SYSTEM (CONSTANT COEFFICIENTS) CHARACTERISTICS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZC107

AD-626 669 1/1
KELLETT AIRCRAFT CORP WILLOW GROVE PA

DOWNWASH TESTS OF THE DUAL TANDEM DUCTED PROPELLER VTOL RESEARCH AIRCRAFT CONFIGURATIONS TO EVALUATE ENGINE INLETS, PROTECTION DEVICES AND STUDY AERODYNAMIC INTERFERENCE, (U)

NOV 65 158P CURTISS,H. C. ,JR.;
REPT. NO. 179T80-12,
CONTRACT: NOw-64-0439

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, DOWNWASH), (*AERODYNAMIC CONFIGURATIONS, RESEARCH PLANES), ENGINE AIR SYSTEMS COMPONENTS, FLIGHT TESTING, DRAG, THRUST, PROPELLER BLADES, SIMULATION, INTERFERENCE, SAFETY DEVICES (U)

A FULL SCALE HALF-MODEL SIMULATION OF A DUAL TANDEM DUCTED PROPELLER VTOL AIRCRAFT WAS TESTED UNDER THE SEVERE ENVIRONMENT CAUSED BY OPERATION SIMULATING VERTICAL FLIGHT IN CLOSE PROXIMITY TO SAND AND CRUSHED STONE COVERED TERRAIN. FOUR ENGINE INLET PROTECTION DEVICES WERE EVALUATED IN THIS SERIES OF TESTS. A WING-LIKE DEFLECTOR DEVICE WAS TESTED IN TWO CONFIGURATIONS OF DIFFERENT CHORD LENGTHS. A FULL INLET SCREEN AND A BLOCKED HALF-SCREEN INLET PROTECTION DEVICE WERE ALSO TESTED. IT WAS FOUND THAT DUE TO ITS LOCATION IN THE UPFLOW REGION, THE FULL SCREEN TENDED TO COLLECT PARTICLES AND THEREBY AGGRAVATED INLET INGESTION. THE BLOCKED HALF-SCREEN AND THE DEFLECTOR DEVICES SIGNIFICANTLY REDUCED INGESTION, BUT WERE NOT SUFFICIENTLY EFFECTIVE TO POSITIVELY PREVENT ENGINE DAMAGE. TESTS OVER CRUSHED STONE CAUSED SIGNIFICANTLY WORSE INLET INGESTION AND AIRFRAME DAMAGE PROBLEMS THAN THOSE EXPERIENCED OVER SAND. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-629 004 14/2 1/3
PRINCETON UNIV N J DEPT OF AEROSPACE AND MECHANICAL SCIENCES

A SURVEY OF V/STOL WIND TUNNEL WALL CORRECTIONS AND TEST TECHNIQUES. (U)

DEC 65 87P OLCOTT,JOHN W. ;
REPT. NO. 725,
CONTRACT: NONR-1858(14)
PROJ: NR-212-155,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, MODEL TESTS), (*WIND TUNNELS, CORRECTIONS), TEST METHODS, ERRORS, WAKE, LIFT, REVIEWS, WIND TUNNEL MODELS, DESIGN, TILT WINGS, PROPELLERS(AERIAL), AIRSHIPS (U)
IDENTIFIERS: FLYING WIND TUNNELS (U)

A DISCUSSION OF WIND TUNNEL BOUNDARY CORRECTIONS AS THEY APPLY TO VTOL MODEL TESTING IS PRESENTED. CONVENTIONAL WALL CORRECTION THEORY IS INADEQUATE SINCE IT FAILS TO ACCOUNT FOR BOTH THE PRESENCE OF A HIGHLY DEVELOPED WAKE AND THE TOTAL LIFT ACTING ON THE MODEL. CORRECTION THEORIES THAT DO CONSIDER THE LIFT AND WAKE CHARACTERISTICS OF VTOL DESIGNS GIVE SATISFACTORY RESULTS, PROVIDED THERE IS NO WAKE DISTORTION DUE TO THE INTERFERENCE OF TUNNEL WALLS. BOTH THE HEYSON AND KIRKPATRICK VTOL BOUNDARY CORRECTION THEORIES ARE EXAMINED AND THEIR LIMITATIONS DISCUSSED. A COMPARISON OF FREE AIR AND TUNNEL RESULTS FOR A .165SCALE NORTH AMERICAN AVIATION TILT WING DESIGN AND A FREE AIR STUDY OF AN EARLY HAMILTON STANDARD XC 142 PROPELLER MODEL ARE DISCUSSED. THE PROPELLER DATA AGREED WITH THEORETICALLY PREDICTED VALUES, BUT DISCREPANCIES, PARTICULARLY IN DRAG FORCE, APPEARED WHEN THE AIRSHIP NORTH AMERICAN AVIATION DATA WERE COMPARED WITH SIMILAR TUNNEL RESULTS. THE EXACT CAUSE OF THE DIFFERENCES WAS NOT DETERMINED. THE IMPORTANCE OF THE VTOL MODEL WAKE IS SUBSTANTIATED. MINIMUM TUNNEL SIZES NECESSARY TO AVOID WAKE IMPINGEMENT AND DISTURBANCE ARE PRESENTED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-630 924 1/1 20/4
GRUMMAN AIRCRAFT ENGINEERING CORP BETHPAGE N Y

WIND TUNNEL TEST OF 1/7 SCALE MODEL OV-1. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
DEC 65 80P SHEPHEARD,FRED W. ;
CONTRACT: DA-44-177-AMC-271(T)
TASK: 1P125901A14203,
MONITOR: USAAVLABS , TR-65-73

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, AERODYNAMIC CHARACTERISTICS), MODEL TESTS, WIND TUNNEL MODELS, DRAG, LIFT, PITCH(MOTION), AIRCRAFT CANOPIES, NACELLES, FUSELAGES, AIRPLANE MODELS (U)
IDENTIFIERS: V-1 AIRCRAFT (U)

WIND TUNNEL TESTS WERE CONDUCTED ON A 1/7 SCALE MODEL OF THE OV-1 AIRPLANE TO DETERMINE THE POWER-OFF DRAG, LIFT, AND PITCHING MOMENT COEFFICIENTS OF THE MODEL AND ITS VARIOUS COMPONENTS. SIGNIFICANT DRAG DIFFERENCES WERE MEASURED BETWEEN PRODUCTION CANOPY AND NACELLE CONFIGURATIONS AND STREAMLINED FUSELAGE AND NACELLE CONFIGURATIONS, BUT ARE NOT CONSIDERED APPLICABLE. NO OTHER SIGNIFICANT DRAG DIFFERENCES WERE MEASURED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-631 413 1/3 21/5
HUGHES TOOL CO CULVER CITY CALIF AIRCRAFT DIV

GROUND AND FLIGHT TESTS, XV-9A HOT CYCLE RESEARCH AIRCRAFT. (U)

DESCRIPTIVE NOTE: SUMMARY REPT., 10 AUG 64-5 FEB 65, MAR 66 156P PIEPER,C. W. ;
REPT. NO. HTC-AD-65-13,
CONTRACT: DA-44-177-AMC-877(T)
TASK: 1M121401D14403,
MONITOR: USAAVLABS , TR-65-68

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*GAS TURBINES, THERMODYNAMIC CYCLES), (*VERTICAL TAKE-OFF PLANES, TESTS), (*THERMODYNAMIC CYCLES, HELICOPTER ENGINES), (*HELICOPTER ENGINES, PERFORMANCE(ENGINEERING)), HELICOPTER ROTORS, FLIGHT TESTING, STRUCTURAL PROPERTIES, PROPULSION, RESEARCH PLANES, FEASIBILITY STUDIES, TEST EQUIPMENT, LOADING(MECHANICS), COOLING (U)
IDENTIFIERS: V-9 AIRCRAFT (U)

THE PERFORMANCE, STRUCTURAL QUALITIES, AND FEASIBILITY OF THE HOT CYCLE ROTOR AND PROPULSION SYSTEM WERE SUCCESSFULLY VERIFIED FOR ALL NORMAL HELICOPTER FLIGHT MODES. GROUND TESTS CONSISTED OF PREFLIGHT AND TIE-DOWN TESTS, WHICH PROVIDED A FUNCTIONAL CHECKOUT OF THE AIRCRAFT SYSTEMS AND TEST INSTRUMENTATION AND A FINAL CHECKOUT OF THE COMPLETED AIRCRAFT PRIOR TO START OF FLIGHT TESTS. THE 15 HOURS OF FLIGHT TESTING INCLUDED EVALUATION OF AIRCRAFT AND ROTOR SYSTEM PERFORMANCE, FLIGHT LOADS, COOLING, AND FLYING QUALITIES IN VARIOUS FLIGHT MODES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-634 777 1/1
DAVID TAYLOR MODEL BASIN WASHINGTON D C AERODYNAMICS LAB

WIND-TUNNEL INVESTIGATION OF THE HOVERING, TRANSITION, AND CRUISING PERFORMANCE OF AN ARRESTED ROTOR (TRIDENT) VTOL AIRCRAFT CONCEPT. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
FEB 66 43P BRASSEUR,GARY W. ;MAGUIRE, WILLIAM B. ;
REPT. NO. DTMB-2172, DTMB-AERO-110;
PROJ: 632-542,

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, PERFORMANCE(ENGINEERING)), HOVERING, ROTARY WINGS, MODEL TESTS, AERODYNAMIC CHARACTERISTICS, WINGS, FLIGHT TESTING (U)

WIND-TUNNEL TESTS WERE CONDUCTED TO EVALUATE STATIC STABILITY AND CONTROL CHARACTERISTICS WITH EMPHASIS ON DETERMINING THE MAGNITUDE OF TRANSITION PROBLEMS. EVALUATING THE COMPATIBILITY OF THE COMPETING INTERNAL AND EXTERNAL AERODYNAMIC REQUIREMENTS FOR HIGH STATIC LIFT AND EFFICIENT CRUISING WAS AN ADDITIONAL TEST OBJECTIVE. TEST RESULTS SHOW THAT THE MODEL EXHIBITS A STRONG DIRECTIONAL TRIM SHIFT THROUGH TRANSITION. THE PATTERN SELECTED FOR ROTOR ARRESTMENT DURING EVALUATION OF THE TRANSITION CHARACTERISTICS WAS NOT ACCEPTABLE ON THE BASIS OF POWER REQUIRED TO SUPPORT VEHICLE WEIGHT OR CONTROL OF TRAJECTORY. THE RESULTS FURTHER INDICATED THAT THE PERFORMANCE POTENTIAL OF THE DUCTED ROTOR -NOZZLE SYSTEM MAY BE LIMITED BECAUSE OF THE STRUCTURAL REQUIREMENTS. MODEL ROTOR DUCT DESIGN, FROM THE STANDPOINT OF INTERNAL AERODYNAMICS, WAS COMPROMISED BY ADDING STRUCTURE TO ACCOMMODATE THE WING BENDING LOADS FOR HIGH-SPEED CRUISING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-633 269 1/4 5/8
BELL AEROSYSTEMS CO BUFFALO N Y

APPLICATION OF PILOT-CONTROLLER INTEGRATION TECHNIQUES TO A REPRESENTATIVE V/STOL AIRCRAFT. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
OCT 65 156P GAUL,JOHN W. ;
REPT. NO. 2226-903001,
CONTRACT: AF 33(615)-1866,
PROJ: AF-8219,
TASK: 821904,
MONITOR: AFFDL , TR-65-200

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *FLIGHT CONTROL SYSTEMS), DESIGN, PILOTS, MAN-MACHINE SYSTEMS, COSTS (U)
IDENTIFIERS: X-22 AIRCRAFT (U)

THE REPORT PRESENTS FINAL RESULTS OF A STUDY OF THE APPLICATION OF PILOT-CONTROLLER INTEGRATION (PCI) DESIGN TECHNIQUES TO THE FLIGHT CONTROL SYSTEM OF A REPRESENTATIVE V/STOL AIRCRAFT. UNDER THIS PROGRAM THE VALIDITY OF THE CONCEPT WAS ESTABLISHED IN THE APPLICATION TO THE X-22A V/STOL. IN THIS APPLICATION THE PCI TECHNIQUE INDICATED THE AREAS OF THE X-22A FLIGHT CONTROL SYSTEM WHERE MODIFICATIONS WOULD RESULT IN THE GREATEST IMPROVEMENT TO THE PROBABILITY OF MISSION ACCOMPLISHMENT. DESIGN MODIFICATIONS WERE MADE AND AN ITERATION USING THE TECHNIQUE WAS ACCOMPLISHED AND THE PAYOFF WAS EVALUATED. THE DIGITAL PROGRAM WAS DEVELOPED AND APPLIED TO THE X-22A HAS GENERAL APPLICABILITY TO OTHER AIRCRAFT. SEVERAL IMPROVEMENTS TO THIS PROGRAM AS WELL AS TO THE DETAILS OF TECHNIQUE APPLICATION ARE SUGGESTED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-634 943 1/3 21/5
GENERAL ELECTRIC CO CINCINNATI OHIO FLIGHT PROPULSION LAB DEPT

X353-5B PROPULSION SYSTEM SPECIFICATION. (U)

JAN 62 108P
REPT. NO. SPECIFICATION-112.
CONTRACT: DA-44-177-TC-715.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON VZ-11 LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-634 944.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *PROPULSION), SPECIFICATIONS, DUCTED FANS, TURBOJET ENGINES, AIRCRAFT ENGINES, RESEARCH PLANES, MILITARY REQUIREMENTS (U)
IDENTIFIERS: V-5 AIRCRAFT, X353-5B ENGINE (U)

THIS SPECIFICATION COVERS THE CHARACTERISTICS OF THE X353-5B CONVERTIBLE V/STOL PROPULSION SYSTEM INTENDED FOR USE IN A PILOTED FLIGHT RESEARCH AIRPLANE. THE GENERAL ELECTRIC X353-5B ENGINE IS A HIGH LIFT-WEIGHT RATIO CONVERTIBLE ENGINE FOR TURBOJET OPERATION AND AUGMENTED LIFT OPERATION. THE BASIC X353-5B ENGINE COMPRISES A TURBOJET ENGINE MODIFIED FOR NON-REHEAT OPERATION, A TIP-TURBINE LIFT FAN AUGMENTING TURBOJET THRUST FOR V/STOL LIFT AND PROPULSIVE THRUSTS, A GAS DIVERTER VALVE FOR SELECTING ENGINE OPERATING MODE, AND ASSOCIATED ENGINE CONTROLS AND ACCESSORIES. THE TWO PART SCROLL ON EACH LIFT FAN PERMITS INCORPORATION OF THE X353-5B INTO AN AIRPLANE POWERPLANT CONFIGURATION COMPRISING TWO (2) BASIC X353-5B CONVERTIBLE ENGINES PNEUMATICALLY COUPLED SUCH THAT EACH TURBOJET PROVIDES HALF OF THE REQUIRED DRIVING POWER FOR EACH OF THE LIFT FANS. ROTORS OF THE TWO LIFT FANS ROTATE IN OPPOSITE DIRECTIONS TO MINIMIZE GYROSCOPIC RELATIONS. ALL PERFORMANCE FIGURES, WEIGHTS, QUANTITIES, ETC., IN THIS SPECIFICATION ARE GIVEN FOR ONE X353-5B (ONE TURBOJET ENGINE, ONE FAN, ONE DIVERTER VALVE) UNLESS SPECIFICALLY STATED OTHERWISE. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-634 944 1/3 21/5
GENERAL ELECTRIC CO CINCINNATI OHIO FLIGHT PROPULSION LAB DEPT

X376 PITCH FAN SPECIFICATION. (U)

MAR 62 56P
REPT. NO. SPECIFICATION-113,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON VZ-11 LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-634 946.

DESCRIPTORS: (*DUCTED FANS, FLIGHT CONTROL SYSTEMS), (*VERTICAL TAKE-OFF PLANES; *FLIGHT CONTROL SYSTEMS), GAS TURBINES, SPECIFICATIONS, TUBOJET ENGINES, AIRCRAFT ENGINES, RESEARCH PLANES, PITCH(MOTION) (U)
IDENTIFIERS: V-5 AIRCRAFT, X376 FAN, X353-5B ENGINES (U)

THIS SPECIFICATION COVERS THE CHARACTERISTICS OF THE X376 PITCH FAN INTENDED FOR USE IN A PILOTED FLIGHT RESEARCH AIRPLANE. THE GENERAL ELECTRIC X376 PITCH FAN IS A HIGH LIFTWEIGHT RATIO GAS-DRIVEN LIFT FAN FOR SUPPLYING AUGMENTED CONTROL AND TRIM FORCE IN V/STOL SYSTEMS. THE X376 PITCH FAN COMPRISES A SINGLE STAGE, TIP-TURBINE DRIVEN LIFT FAN SUPPLIED WITH TURBOJET EXHAUST GAS BLEED THROUGH TWO SEPARATE NOZZLE SCROLLS. THE DOUBLE SCROLL ARRANGEMENT PROVIDES SINGLE-ENGINE OPERATING CAPABILITY IN A TWO-ENGINE, CROSS-DUCTED LIFT PROPULSION SYSTEM. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-634 945 1/3 21/5
GENERAL ELECTRIC CO CINCINNATI OHIO FLIGHT PROPULSION LAB DEPT

X353-5B PROPULSION SYSTEM FLIGHTWORTHINESS RATING TEST. (U)

MAR 62 30P
REPT. NO. SPECIFICATION-114,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON VZ-11 LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-634 944.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *PROPULSION), FLIGHT TESTING, SPECIFICATIONS, DUCTED FANS, TUBOJET ENGINES, AIRCRAFT ENGINES, RESEARCH PLANES, TESTS (U)
IDENTIFIERS: V-5 AIRCRAFT, X353-5B ENGINES (U)

THIS SPECIFICATION DEFINES THE FLIGHTWORTHINESS RATING TEST REQUIREMENTS FOR THE X353-5B CONVERTIBLE, DUCTED LIFT FAN PROPULSION SYSTEM. THE X353-5B PROPULSION SYSTEM IS COMPRISED OF A J85-GE-5 TURBOJET ENGINE, LESS AFTERBURNER, USED AS A GAS GENERATOR PLUS TWO ADDITIONAL MAJOR COMPONENTS: A DIVERTER VALVE TO DIRECT THE GAS FLOW; AND AN X353-5B LIFT FAN. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOMO7

AD-634 946 1/3 21/5
GENERAL ELECTRIC CO CINCINNATI OHIO FLIGHT PROPULSION LAB DEPT

X376 PITCH FAN FLIGHTWORTHINESS RATING TEST. (U)

DESCRIPTIVE NOTE: REVISED ED.
APR 62 30P
REPT. NO. SPECIFICATION-115,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REVISION OF DOCUMENT SUBMITTED 25 MAR 62. REPORT ON VZ-11 LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-634 944/

DESCRIPTORS: (*DUCTED FANS, FLIGHT CONTROL SYSTEMS), (*VERTICAL TAKE-OFF PLANES, *FLIGHT CONTROL SYSTEMS), FLIGHT TESTING, SPECIFICATIONS, GAS TURBINES, AIRCRAFT ENGINES, RESEARCH PLANES, PITCH(MOTION) (U)
IDENTIFIERS: V-5 AIRCRAFT, X376 FAN (U)

THIS SPECIFICATION DEFINES THE FLIGHTWORTHINESS RATING TEST REQUIREMENTS FOR THE X376, DUCTED, PITCH TRIM CONTROL FAN. THE GENERAL ELECTRIC X376 PITCH FAN IS DESIGNED FOR SUPPLYING AUGMENTED CONTROL AND TRIM FORCE IN V/STOL SYSTEMS. IT IS COMPRISED OF A SINGLE STAGE, TIP-TURBINE DRIVEN FAN SUPPLIED WITH TURBOJET EXHAUST GAS BLEED THROUGH TWO SEPARATED NOZZLE SCROLLS. THE DOUBLE SCROLL ARRANGEMENT PROVIDES SINGLE-ENGINE OPERATING CAPABILITY IN A TWO-ENGINE, CROSS-DUCTED LIFT PROPULSION SYSTEM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-634 947 1/3 21/5
GENERAL ELECTRIC CO CINCINNATI OHIO FLIGHT PROPULSION LAB DEPT

X353-5B PROPULSION SYSTEM ACCEPTANCE TEST. (U)

DESCRIPTIVE NOTE: REVISED ED.
MAY 62 28P
REPT. NO. SPECIFICATION-116,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REVISION OF DOCUMENT SUBMITTED 15 APR 62. REPORT ON VZ-11 LIFT FAN FLIGHT RESEARCH ARICRAFT PROGRAM. SEE ALSO AD-634, 945.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *PROPULSION), TESTS, SPECIFICATIONS, DUCTED FANS, TUROJET ENGINES, AIRCRAFT ENGINES, RESEARCH PLANES, VALUES, ACCEPTABILITY (U)
IDENTIFIERS: V-5 AIRCRAFT, X-353-5B ENGINES (U)

THIS SPECIFICATION DEFINES THE ACCEPTANCE TEST REQUIREMENTS FOR THE LIFT FAN AND DIVERTER VALUE COMPONENTS OF THE X353-5B CONVERTIBLE, DUCTED, LIFT FAN PROPULSION SYSTEM CONFORMING TO SPECIFICATION NO. 112. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-634 948 1/3 21/5
GENERAL ELECTRIC CO CINCINNATI OHIO FLIGHT PROPULSION LAB DEPT

X376 PITCH FAN ACCEPTANCE TEST. (U)

DESCRIPTIVE NOTE: RREVISED ED.
MAY 62 29P
REPT. NO. SPECIFICATION-117,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REVISION OF DOCUMENT SUBMITTED 18 APRIL 1962. REPORT ON VZ-11 LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-634 944.

DESCRIPTORS: (*DUCTED FANS, FLIGHT CONTROL SYSTEMS), (*VERTICAL TAKE-OFF PLANES, *FLIGHT CONTROL SYSTEMS), SPECIFICATIONS, ACCEPTABILITY, TESTS, TURBOJET ENGINES, AIRCRAFT ENGINES, RESEARCH PLANES, PITCH(MOTION) (U)
IDENTIFIERS: V-5 AIRCRAFT, X376 FAN (U)

THIS SPECIFICATION DEFINES THE ACCEPTANCE TEST REQUIREMENTS FOR THE X376, DUCTED, PITCH TRIM CONTROL FAN CONFORMING TO SPECIFICATION NO. 113. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-634 950 1/3 21/5
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

X353-5B PROPULSION SYSTEM FLIGHTWORTHINESS TEST REPORT (PENALTY TESTS). VOLUME I. SUPPLEMENT I. (U)

OCT 63 72P
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*PROPULSION, *VERTICAL TAKE-OFF PLANES), FLIGHT TESTING, RESEARCH PLANES, TURBOJET ENGINES, CONVERTIBLE PLANES, DUCTED FANS (U)
IDENTIFIERS: V-5 AIRCRAFT, X 353-5B ENGINES (U)

THE REQUIRED 10-HOUR PENALTY TEST TO EVALUATE DESIGN MODIFICATIONS TO THE X353-5B LIFT FAN INLET VANES AND ALUMINUM EXIT LOUVERS WAS COMPLETED IN ACCORDANCE WITH THE SCHEDULE OF TEST RECOMMENDED TO THE ARMY IN THE X353-5B PROPULSION SYSTEM FLIGHTWORTHINESS TEST REPORT. THE TEST WAS COMPLETED ON A SLAVE X353-5B LIFT FAN WHICH WAS ALSO AN ACCEPTANCE TEST VEHICLE. THIS REPORT IS A SUPPLEMENT TO THE X353-5B PROPULSION SYSTEM FLIGHTWORTHINESS TEST REPORT AND DOCUMENTS THE PENALTY TEST AND RESULTS. IT IS SUBMITTED TO THE U. S. ARMY (TRECOM) IN ACCORDANCE WITH SPECIFICATION 114 TO FORM THE BASIS FOR ESTABLISHING A FLIGHTWORTHINESS RATING FOR THE COMPLETE PROPULSION SYSTEM INCLUDING LIFT FAN INLET VANES, ALUMINUM EXIT LOUVERS AND DIVERTER VALVES. UPON COMPLETION OF THE TEST, THE INSPECTION RESULTS SHOWED ALL LIFT FAN COMPONENTS INCLUDING INLET VANES AND ALUMINUM EXIT LOUVERS TO BE IN SATISFACTORY CONDITION. THE NEW ROTOR ASSEMBLY TECHNIQUE RECOMMENDED IN THE FWT REPORT AND DESCRIBED IN FRV SPECIFICATION 124 WAS COMPLETELY SUCCESSFUL IN AVOIDING FRETTING. PARTIAL DISASSEMBLY OF THE ROTOR FOLLOWING THE TEST, WITNESSED BY AN ARMY (TRECOM) REPRESENTATIVE, SHOWED ALL OF THE ROTOR HARDWARE TO BE IN EXCELLENT CONDITION. THE XV-5A FLIGHT TYPE DIVERTER VALVE ACTUATION SUCCESSFULLY COMPLETED THE PENALTY TEST PLUS TWO ACCEPTANCE TESTS WITHOUT INCIDENT AND IS IN EXCELLENT CONDITION. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-634 951 11/3 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO FLIGHT PROPULSION LAB DEPT

FINISH SPECIFICATION. (U)

AUG 62 13P
REPT. NO. SPECIFICATION-14359-1,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON VZ-11 LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *AIRCRAFT FINISHES), SPECIFICATIONS, PROTECTIVE TREATMENTS, RESEARCH PLANES, FINISHES + FINISHING, COATINGS, CORROSION INHIBITION, ALUMINUM ALLOYS, MAGNESIUM ALLOYS, TITANIUM ALLOYS, STEEL, PIPES, ALLOYS, GLASS TEXTILES (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE PURPOSE OF THIS SPECIFICATION IS TO DEFINE THE FINISHES NECESSARY TO ASSURE ADEQUATE SURFACE PROTECTION FOR THE MATERIALS USED IN THE ARMY VZ-11 AIRPLANES (MODEL 143). (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-635 106 1/3 21/5
LOCKHEED-GEORGIA CO MARIETTA

XV-4A VTOL RESEARCH AIRCRAFT PROGRAM. (U)

DESCRIPTIVE NOTE: SUMMARY REPT., 30 JUN 61-30 SEP 65.
MAY 66 123P NICHOLSON, ROBERT ;LOWRY,
RANDALL B. ;
CONTRACT: DA-44-177-TC-773,DA-44-177-AMC-14(T)
PROJ: DA-1F131201D160,
MONITOR: USAAVLABS TR-66-45

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *THRUST AUGMENTATION), RESEARCH PLANES, FLIGHT TESTING, JETS, EJECTION, LIFT, FLIGHT CONTROL SYSTEMS, FEASIBILITY STUDIES, EXHAUST GASES, PROPULSION (U)
IDENTIFIERS: V-4 AIRCRAFT (U)

A PROGRAM WAS CONDUCTED TO DETERMINE THE FEASIBILITY OF THE AUGMENTED JET EJECTOR CONCEPT FOR ATTAINING A VTOL CAPABILITY FOR AIRCRAFT. DURING THE FLIGHT TEST PROGRAM, THE ACTUAL VERTICAL THRUST REALIZED WAS ONLY ABOUT 93 PERCENT OF THAT PREDICTED, AND CONSEQUENTLY THE AIRCRAFT, THE XV-4A, HAD A MARGINAL LIFT CAPABILITY. THIS MARGINAL LIFT CAPABILITY SEVERELY LIMITED THE CAPABILITY TO CONDUCT QUANTITATIVE DATA GATHERING DURING THE FLIGHT TEST PROGRAM. THE REPORT PRESENTS THE LIMITED QUANTITATIVE RESULTS OBTAINED AND A BRIEF SUMMARY OF THE AIRCRAFT DESIGN, SYSTEMS, FLIGHT TEST PROGRAM, VTOL LIFT IMPROVEMENT PROGRAM, AND SMALL-SCALE AND FULL-SCALE WIND TUNNEL PROGRAMS. THE FEASIBILITY OF THE AUGMENTED JET EJECTOR CONCEPT WAS DEMONSTRATED; HOWEVER, THIS CONCEPT IS NOT CONSIDERED TO BE COMPETITIVE WITH OTHER CONCEPTS FOR ATTAINING A VTOL CAPABILITY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-635 489 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED TECHNOLOGY AND DEMONSTRATOR PROGRAMS DEPT

GROUND VIBRATION TEST RESULTS. (U)

APR 66 107P
REPT. NO. 167.
CONTRACT: DA-44-177-TC-715.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON SV-5A LIFT VAN FLIGHT RESEARCH AIRCRAFT. SEE ALSO AD-634 949.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, VIBRATION), TESTS, RESEARCH PLANES, PERFORMANCE (ENGINEERING), CAPTIVE TESTS, RESONANCE, EXPERIMENTAL DATA, MOTION (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THIS REPORT CONTAINS THE RESULTS OF THE EXPERIMENTAL INVESTIGATION OF THE STATIC AND DYNAMIC CHARACTERISTICS OF THE U.S. ARMY XV-5A LIFT FAN RESEARCH AIRCRAFT AS PERTAINING TO THE FLUTTER AND VIBRATION EFFORT ON THE XV-5A AIRCRAFT. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-635 640 1/3 21/5
GENERAL ELECTRIC CO CINCINNATI OHIO FLIGHT PROPULSION LAB DEPT

X-353-5B PROPULSION SYSTEM FLIGHTWORTHINESS TEST REPORT. VOLUME II. (U)

JAN 63 140P
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON VZ-11 LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-634 950.

DESCRIPTORS: (*PROPULSION, *VERTICAL TAKE-OFF PLANES), FLIGHT TESTING, RESEARCH PLANES, TURBOJET ENGINES, DUCTED FANS, VALVES, QUALITY CONTROL, DEFECTS(MATERIALS) (U)
IDENTIFIERS: V-5 AIRCRAFT, X353-5B ENGINES (U)

THIS VOLUME OF THE FWT REPORT PRESENTS PHOTOGRAPHS WITH A BRIEF IDENTIFICATION OF HARDWARE CONDITION AND DISCREPANCIES FOUND AFTER COMPLETION OF TESTS DESCRIBED IN SPECIFICATIONS NUMBER 114 AND 115. CERTIFICATES OF INSPECTION ARE INCLUDED. CLEARANCE CHECKS WERE IDENTICAL WITH ORIGINAL ASSEMBLY VALUES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-635 695 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO FLIGHT PROPULSION LAB DEPT

AIRPLANE DETAIL SPECIFICATION. (U)

APR 63 170P
REPT. NO. SPECIFICATION-118A,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-634 943.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, SPECIFICATIONS), DESIGN, DUCTED FANS, LIFT, TURBOJET ENGINES, RESEARCH PLANES, PROPULSION (U)
IDENTIFIERS: V-5 AIRCRAFT, X353-5B ENGINES (U)

THIS SPECIFICATION COVERS A MID-WING, LIFT-FAN POWERED RESEARCH AIRCRAFT. IT SHALL BE PROPELLED BY TWO G. E. X353-5B PROPULSION SYSTEMS. IT SHALL BE CAPABLE OF VTOL AND STOL IN THE FAN-SUPPORTED FLIGHT MODE. THE AIRCRAFT SHALL BE CAPABLE OF CONVENTIONAL WING-SUPPORTED FLIGHT AT HIGH SUBSONIC SPEEDS. THE AIRCRAFT SHALL ALSO BE CAPABLE OF TRANSITION FROM ZERO HORIZONTAL SPEED TO HIGH HORIZONTAL SPEED AND RETURN THROUGH TRANSITION TO HOVERING FLIGHT. IT SHALL BE CAPABLE OF CONVENTIONAL TAKE-OFF AND LANDING. DURING WING-SUPPORTED FLIGHT, CONVENTIONAL CONTROL SURFACES SHALL BE UTILIZED. DURING FAN SUPPORTED FLIGHT, CONTROL SHALL BE ACCOMPLISHED THROUGH MODULATION OF THE ARFLOW THROUGH THE FANS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOm07

AD-635 951 1/3 20/4 1/1
CORNELL AERONAUTICAL LAB INC BUFFALO N Y

DEVELOPMENT OF A METHOD FOR PREDICTING THE PERFORMANCE AND STRESSES OF VTOL-TYPE PROPELLERS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.
JUN 66 126P TRENKA, ANDREW R. ;
REPT. NO. CAL-BB-1846-S-1,
CONTRACT: DA-44-177-AMC-754T),
TASK: 1D121401A142,
MONITOR: USAAVLABS TR-66-26

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, PERFORMANCE(ENGINEERING)), (*PROPELLERS(AERIAL), STRESSES), (*WINGS, AERODYNAMIC CHARACTERISTICS), (*NACELLES, AERODYNAMIC CHARACTERISTICS), PROPELLER BLADES, TESTS, AEROELASTICITY, THRUST, AERODYNAMIC LOADING, MATHEMATICAL PREDICTION (U)

THE REPORT PRESENTS A THEORETICAL METHOD WHICH ALLOWS THE PREDICTION OF PERFORMANCE AND STRESS CHARACTERISTICS OF A SINGLE VTOL-TYPE OF PROPELLER-WING-NACELLE COMBINATION OPERATING IN VARIOUS FLIGHT CONDITIONS FROM HOVERING THROUGH TRANSITION AND INTO AXIAL FLIGHT. THE METHOD INCLUDES (1) THE EFFECTS OF A DISTORTED WAKE, I. E., THE EFFECTS OF CONTRACTION AND RADIAL AND AXIAL VELOCITY VARIATIONS; (2) THE EFFECTS OF HOVERING CLOSE TO THE GROUND; (3) THE INTERFERENCE EFFECTS FROM A NACELLE AND WING BURIED IN THE PROPELLER SLIPSTREAM. ALSO PRESENTED ARE EXPERIMENTAL THRUST AND TORQUE DATA. HOWEVER, BECAUSE OF THE INSUFFICIENT ACCURACY OF THE EXPERIMENTAL DATA COLLECTED, NO DEFINITE EVALUATION OF THE MODEL IS MADE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZUM07

AD-636 263 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

WEIGHT ANALYSIS. (U)

NOV 63 19P
REPT. NO. 134,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT ON XV-5A LIFT FAN, FLIGHT RESEARCH AIRCRAFT PROGRAM, SEE ALSO AD-635 695.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, WEIGHT), ANALYSIS, RESEARCH PLANES, DESIGN, DUCTED FANS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

AIRCRAFT WEIGHT INCREASED DURING THE DESIGN AND MANUFACTURING OF THE XV-5A, IN SPITE OF THE CLOSE SURVEILLANCE AND CAREFUL CONSIDERATION OF THE PRINCIPAL PROGRAM OBJECTIVES AND THE BEST WAY TO MEET THE NEEDS OF THE ARMY. THE OVERWEIGHT ESTIMATE OF 335 POUNDS BECOMES SECONDARY WHEN THE ADDITIONAL SYSTEM LIFT (1000 POUNDS) IS CONSIDERED. AT REDUCED LOAD FACTOR 3.72 RATHER THAN 4.0, THE ENDURANCE TIMESUNDER VTOL CONDITIONS ARE PREDICTED TO BE IN ACCORDANCE WITH THE SPECIFICATION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-636 264 1/3 1/4
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

PRIMARY FLIGHT CONTROL SYSTEMS STRUCTURAL ANALYSIS. (U)

JAN 64 35P
REPT. NO. 140, 1
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM, SEE ALSO AD-636 263.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *FLIGHT CONTROL SYSTEMS), STRUCTURAL PROPERTIES, ANALYSIS, TESTS, MATHEMATICAL ANALYSIS, STRUCTURES, DUCTED FANS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE STRUCTURAL ANALYSIS OF MODEL XV-5A PRIMARY FLIGHT CONTROL SYSTEMS IS PRESENTED IN THIS REPORT. THE PRIMARY FLIGHT CONTROL SYSTEMS CONSIST OF CONVENTIONAL STICK AND RUDDER PEDALS MECHANICALLY CONNECTED TO RUDDER, ELEVATOR, AND TO SERVO ACTUATORS, WHICH CONTROL THE AILERONS, WING-FAN EXIT LOUVERS AND NOSE-FAN THRUST MODULATOR. THE STRUCTURAL ANALYSIS IS PRIMARILY INTENDED TO PROVIDE LOAD INFORMATION FOR THE MAJOR COMPONENTS. THE CONVENTIONAL FLIGHT CONTROL SYSTEMS WERE SATISFACTORILY TESTED IN THE AIRPLANE BY APPLYING LIMIT LOAD TO THE COCKPIT CONTROLS AND REACTING THE LOAD BY LOCKING THE SURFACES. THE WING-FAN LOUVER AND NOSE-FAN MODULATOR ACTUATING MECHANISMS WERE SATISFACTORILY PROOF TESTED ON THE SIMULATOR. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-636 573 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

GROUND RESONANCE TEST PLAN. (U)

SEP 63 61P
REPT. NO. 128,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM, SEE ALSO AD-636 574.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, VIBRATION), TESTS, RESONANCE, TEST METHODS, RESEARCH PLANES (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THIS REPORT DESCRIBES THE DETAILED PLAN FOR DETERMINING THE EXPERIMENTAL VIBRATION CHARACTERISTICS OF THE U.S. ARMY MODEL XV-5A LIFT-FAN FLIGHT RESEARCH AIRPLANE. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-635 574 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

STRUCTURAL ANALYSIS OF WING SECONDARY COMPONENTS. (U)

DEC 63 98P
REPT. NO. 138,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM, SEE ALSO AD-635 695.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, STRUCTURAL PROPERTIES), (*WINGS, VERTICAL TAKE-OFF PLANES), RESEARCH PLANES, STRUCTURAL PARTS, DUCTED FANS, AILERONS, FLAPS, TRAILING EDGE, DOORS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

STRUCTURAL ANALYSIS OF THE FLAP, AILERON, WING FAN CLOSURE DOORS, WING TRAILING EDGE, AND WING FITTINGS FOR THE U.S. ARMY XV-5A LIFT FAN RESEARCH AIRCRAFT ARE PRESENTED IN THIS REPORT. FOR EACH COMPONENT, A SUMMARY TYPE ANALYSIS IS PRESENTED PRIMARILY WITH THE INTENT OF GIVING STRUCTURAL CONFIGURATION, FINAL CRITICAL LOADING, AND ASSUMPTIONS MADE. STRUCTURAL PROOF TESTS WERE CONDUCTED SATISFACTORILY ON THE BASIC WING, THE FAN DOORS, FAN FITTINGS, FLAP AND AILERON. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-638 366 1/3 21/5
HUGHES TOOL CO CULVER CITY CALIF AIRCRAFT DIV

XV-9A HOT CYCLE RESEARCH AIRCRAFT PROGRAM. (U)

DESCRIPTIVE NOTE: SUMMARY REPT. 29 SEP 62-15 MAR 65.
JUN 66 78P COHAN,S. ;HIRSH,N. B. ;
REPT. NO. HTC-AD-65-27,
CONTRACT: DA-44-177-AMC-877(T),
TASK: 1M121401D14403,
MONITOR: USAAVLABS TR-66-10

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, ROTARY WINGS), RESEARCH PLANES, PROPULSION, GAS GENERATING SYSTEMS, DESIGN, CAPTIVE TESTS, FLIGHT TESTING (U)
IDENTIFIERS: V-9 AIRCRAFT, HOT CYCLE PROPULSION SYSTEMS,YT-64 GAS GENERATOR (U)

THE REPORT SUMMARIZES A RESEARCH PROGRAM COVERING THE DESIGN, FABRICATION, AND TEST OF THE XV-9A HOT CYCLE RESEARCH AIRCRAFT. DISCUSSION OF THE PROGRAM IS BROKEN INTO FIVE MAJOR AREAS: DESIGN AND FABRICATION, ENGINE AND WHIRL TESTS, COMPONENT TESTING, GROUND TESTS, AND FLIGHT TESTS. DURING THE PROGRAM, CONDUCTED FROM 29 SEPTEMBER 1962 THROUGH 15 MARCH 1965, THE FLIGHT FEASIBILITY OF THE HOT CYCLE ROTOR WAS SUCCESSFULLY VALIDATED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-639 229 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

FINAL SYSTEMS ANALYSIS AND FLIGHT SIMULATION REPORT. VOLUME I. (U)

MAR 65 226P
REPT. NO. 157-VOL-1,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5 LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *FLIGHT SIMULATORS), (*RESEARCH PLANES, VERTICAL TAKE-OFF PLANES), ANALYSIS, TESTS, LIFT (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

A COMPREHENSIVE DOCUMENTATION OF THE FLIGHT SIMULATOR STUDY IS GIVEN. SIMULATOR INVESTIGATIONS OF HIGH SPEED CONVENTIONAL FLIGHT ARE DESCRIBED. THE CONSTRUCTION OF THE XV-5A FLIGHT SIMULATOR FROM INITIAL DEVELOPMENT OF METHODS FOR INCORPORATION OF THE AIRCRAFT AERO-PROPULSION CHARACTERISTICS INTO THE ANALOG COMPUTER TO FINAL CHECKOUT OF THE COMPLETED HYDRAULIC AND CONTROLS SIMULATOR IS GIVEN. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-639 230 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

FINAL SYSTEMS ANALYSIS AND FLIGHT SIMULATION REPORT. VOLUME II. (U)

MAR 65 121P
REPT. NO. 157-VOL-2,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5 LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-639 229.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, SIMULATION), (*RESEARCH PLANES, VERTICAL TAKE-OFF PLANES), FLIGHT SIMULATORS, FLIGHT TESTING, ANALYSIS, STABILITY, HOVERING, LIFT (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

STABILITY AUGMENTATION (SA) SYSTEM GAINS WERE OPTIMIZED BY PILOTED FLIGHT SIMULATOR EVALUATION OF HOVERING UNDER GUSTY WIND CONDITIONS. WHILE OPERATION OF THE SA SYSTEM POSES NO PROBLEMS DURING TRANSITION, STABILITY AUGMENTATION IS UNNECESSARY ABOVE 40 KNOTS IAS. FOR THE 2,500 FT. HOT DAY CONDITIONS SIMULATED, THE RAPIDITY WITH WHICH A CONSTANT ALTITUDE TRANSITION FROM HOVERING COULD BE ACCOMPLISHED WAS LIMITED BY POWER AVAILABLE AND, AT THE MORE AFT C.G. LOCATIONS WHEN USING A NOSE FAN THRUST REVERSAL CAPABILITY OF 30%, BY LONGITUDINAL TRIM CAPABILITY. AN AUTOMATIC HORIZONTAL TRIM FEATURE HAS BEEN SELECTED FOR TRANSITION WHICH PROGRAMS THE TAIL TO THE FULL 20 DEGREE INCIDENCE LIMIT AT ALL LOUVER VECTOR ANGLES OF 40 DEGREES OR LESS. CONVERSION BETWEEN CONVENTIONAL AND FAN FLIGHT MODES IS ACCOMPLISHED BY TIMED SEQUENCING OF THE WING FAN DOOR OPENING AND HORIZONTAL TAIL INCIDENCE CHANGE AS A FUNCTION OF DIVERTER VALVE MOTION. FAILURE STUDIES HAVE SHOWN THAT UNCOMMANDED TAIL MOTION COULD RESULT IN A DANGEROUS FLIGHT CONDITION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-639 231 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

PHASE I FLIGHT TEST RESULTS. VOLUME I. (U)

MAR 66 191P
REPT. NO. 166-VOL-1,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FLIGHT TESTING), (*RESEARCH PLANES, FLIGHT TESTING), HOVERING, LIFT, DUCTED FANS, FEASIBILITY STUDIES, TAKE-OFF, PROPULSION (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE U.S. ARMY XV-5A SATISFACTORILY COMPLETED AN EXTENSIVE FLIGHT TEST PROGRAM CONSISTING OF INVESTIGATIONS OF THE HOVERING, TRANSITION AND CONVENTIONAL FLIGHT REGIMES. A TOTAL OF 45 FLIGHT HOURS WERE ACCOMPLISHED DURING WHICH 53 VERTICAL TAKE-OFFS, 72 CONVENTIONAL TAKE-OFFS, 17 FAN FLIGHT MODE TAKE-OFFS AT FORWARD SPEED, AND 74 CONVERSIONS BETWEEN FAN AND CONVENTIONAL FLIGHT MODES WERE PERFORMED. ORIGINAL FLIGHT TEST OBJECTIVES WERE SYSTEMATICALLY ACCOMPLISHED IN SUCCESSFULLY DEMONSTRATING THE FEASIBILITY OF THE LIFT FAN CONCEPT OF FLIGHT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZUM07

AD-639 232 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

PHASE I FLIGHT TEST RESULTS. VOLUME II. (U)

MAR 66 215P
REPT. NO. 166-VOL-2,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5 LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-639 231.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FLIGHT TESTING), (*RESEARCH PLANES, FLIGHT TESTING), LIFT, DUCTED FANS, STABILITY, THERMODYNAMICS, AIRCRAFT EQUIPMENT, PROPULSION, LANDING GEAR, LOADING(MECHANICS) (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

CONTENTS: CONVENTIONAL FLIGHT TEST RESULTS (PERFORMANCE, STABILITY AND CONTROL, THERMODYNAMICS); AIRCRAFT SYSTEMS (HYDRAULIC, ELECTRICAL, PROPULSION SYSTEM HISTORY, XV-5A LANDING GEAR, AIRSPEED SYSTEM); STRUCTURES AND LOADS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-639 233 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

PHASE I FLIGHT TEST RESULTS. VOLUME III. (U)

MAR 66 248P
REPT. NO. 166-VOL-3,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5 LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-639 232.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FLIGHT TESTING), (*RESEARCH PLANES, FLIGHT TESTING), GRAPHICS, LIFT, DUCTED FANS, STABILITY, FLIGHT CONTROL SYSTEMS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE VOLUME CONSISTS OF APPENDIX FIGURES EXCLUSIVELY. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-639 235 1/1 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

ESTIMATED DYNAMIC STABILITY CHARACTERISTICS. (U)

SEP 64 130P
REPT. NO. 151,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, STABILITY), (*RESEARCH PLANES, VERTICAL TAKE-OFF PLANES), DYNAMICS, LIFT, DUCTED FANS, AERODYNAMIC CHARACTERISTICS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE REPORT PRESENTS THE DYNAMIC STABILITY CHARACTERISTICS OF THE U.S. ARMY XV-5A LIFT FAN RESEARCH AIRCRAFT BASED ON THEORETICAL AND EMPIRICAL ESTIMATES OF DYNAMIC STABILITY DERIVATIVES AND STATIC AERODYNAMIC CHARACTERISTICS DERIVED FROM SCALE MODEL WIND TUNNEL TESTS. EXCEPT FOR A PRESENTATION OF THE LIFT FAN NATURAL DAMPING CONTRIBUTIONS TO FLIGHT IN THE LIFT FAN MODE, THE REPORT IS RESTRICTED TO ANALYSIS OF CONVENTIONAL FLIGHT CHARACTERISTICS. INVESTIGATION SHOWS THAT THE DYNAMIC STABILITY CHARACTERISTICS OF THE AIRCRAFT ARE SATISFACTORY FOR THE RESEARCH OBJECTIVES WITHIN THE EXAMINED FLIGHT ENVELOPE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZUM07

AD-639 236 1/1 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

ESTIMATED STATIC STABILITY AND CONTROL CHARACTERISTICS. (U)

MAR 64 230P
REPT. NO. 146,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, AERODYNAMIC CHARACTERISTICS), (*RESEARCH PLANES, VERTICAL TAKE-OFF PLANES), FLIGHT CONTROL SYSTEMS, STATICS, STABILITY, MODEL TESTS, WIND TUNNEL MODELS, DUCTED FANS, HOVERING, LIFT (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE XV-5A IS A TWO-ENGINE, TWO-PLACE V/STOL RESEARCH AIRCRAFT WITH A DESIGN GROSS WEIGHT OF 9200 POUNDS AND AN ASPECT RATIO 3.42 WING OF 260 SQUARE FEET. IN CONVENTIONAL FLIGHT MODE THE AIRCRAFT HAS A POWER-OFF FLAPS-DOWN STALL SPEED OF 89 KNOTS AND A DESIGN MAXIMUM SPEED OF 450 KNOTS. IN FAN FLIGHT MODE THE AIRCRAFT CAN SUSTAIN FLIGHT AT ANY SPEED FROM HOVERING TO SPEEDS IN EXCESS OF CONVENTIONAL STALL SPEED. THE REPORT REPRESENTS AN ESTIMATE THE XV-5A AERODYNAMIC CHARACTERISTICS, BASED ON THEORETICAL AND EMPIRICAL CONSIDERATIONS, INCLUDING THE RESULTS OF 420 HOURS OF WIND TUNNEL TESTS OF 1/8 AND 1/6 SCALE MODELS. IN THE FAN FLIGHT MODE, THE AIRCRAFT IS ESTIMATED TO BE STATICALLY UNSTABLE IN PITCH WITH THE MOST AFT CG AT LOW SPEEDS BELOW APPROXIMATELY 70 KNOTS BUT WITH AN INCREASING STABILITY WITH SPEED TO THE CONVERSION SPEED WHERE THE STABILITY LEVEL CORRESPONDS TO THAT FOR CONVENTIONAL FLIGHT. THE AIRCRAFT POSSESSES POSITIVE LATERAL AND DIRECTIONAL STATIC STABILITY WITH SIDESLIP AT ALL FORWARD SPEEDS IN FAN-POWERED FLIGHT AND THE EFFECTIVENESS OF THE CONVENTIONAL FLIGHT CONTROL SYSTEM IS SHOWN TO BE UNAFFECTED BY FAN OPERATION. THE EXIT LOUVER CONTROL SYSTEM IS CAPABLE OF PROVIDING THE REQUIRED PROPULSIVE FORCE FOR ACCELERATION OF THE AIRPLANE FROM A MINIMUM OF 10 KNOTS REARWARD TO CONVERSION SPEED AND PROVIDES A THRUST ATTENUATION OF UP TO 22% FOR HOVERING LIFT CONTROL. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-640 338 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

FUSELAGE STRUCTURAL ANALYSIS. VOLUME IV. ENGINE INLET, THRUST SPOILER, PITCH FAN LOUVERS. (U)

MAR 65 44P
REPT. NO. 144,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FUSELAGES), (*RESEARCH PLANES, FUSELAGES), (*FUSELAGES, STRUCTURAL PROPERTIES), AIRCRAFT ENGINE DUCTS, SPOILERS, DUCTED FANS, THRUST, PITCH(MOTION), ANALYSIS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE STRUCTURAL ANALYSES OF THE ENGINE AIR INLET, THE THRUST SPOILER INSTALLATION, AND THE PITCH FAN LOUVER INSTALLATION OF THE U. S. ARMY XV-5A LIFT RESEARCH AIRCRAFT ARE PRESENTED. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-640 339 1/1 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

FULL-SCALE WINDTUNNEL TEST PROGRAM. (U)

DEC 63 37P
REPT. NO. 135,
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PT. ON XV-5A LIFT FAN RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FLIGHT TESTING), (*RESEARCH PLANES, FLIGHT TESTING), WIND TUNNELS, AERODYNAMIC CHARACTERISTICS, STRUCTURAL PROPERTIES, INSTRUMENTATION, PERFORMANCE(ENGINEERING) (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE REPORT DESCRIBES THE DETAILED PLANS FOR THE FULL-SCALE WINDTUNNEL TESTING OF THE U. S. ARMY XV-5A LIFT-FAN RESEARCH AIRCRAFT. THE TEST PROGRAM IS DESIGNED TO INVESTIGATE THE AERODYNAMIC AND STRUCTURAL BEHAVIOR OF THE AIRCRAFT DURING SIMULATED TRANSITION, CONVERSION AND LOW SPEED CONVENTIONAL FLIGHT. DETAILED TEST SCHEDULES, INSTRUMENTATION AND DATA REQUIREMENTS AND OPERATIONAL LIMITS ARE DESCRIBED FOR THE TESTS THAT WILL BE PERFORMED AT THE NASA - AMES RESEARCH CENTER IN THE FULL-SCALE, 40 BY 80 FOOT, WINDTUNNEL FACILITIES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-640 340 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

STRUCTURAL PROOF TEST PROGRAM. (U)

66 77P
CONTRACT: DA-44-177-TC-715,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, STRUCTURAL PROPERTIES), (*RESEARCH PLANES, STRUCTURAL PROPERTIES), TEST, LOADING(MECHANICS) (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE TEST PROGRAM IS DESIGNED TO DEMONSTRATE INTEGRITY OF AIRCRAFT STRUCTURE AND THE INFORMATION PRESENTED WILL BE USED TO ESTABLISH DETAIL TEST PROCEDURES. THE PARTICULAR FLIGHT AND LANDING LOAD CONDITIONS TO BE SIMULATED DURING TEST HAVE BEEN DERIVED FROM STRUCTURAL ANALYSIS USING THE CONDITIONS SPECIFIED IN THE AIRPLANE STRUCTURAL DESIGN CRITERIA AND HAVE BEEN FOUND CRITICAL. A DETAILED LISTING OF ALL TEST DATA REQUIREMENTS IS GIVEN. THE PARTICULAR LOADS AND REACTIONS TO BE APPLIED TO THE AIRFRAME AND THE MAJOR COMPONENTS ARE ALSO GIVEN. ALONG WITH THE STRENGTH TESTS, SOME ADDITIONAL CONTROL SYSTEM TESTS ARE TO BE PERFORMED AND ARE ALSO DESCRIBED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-640 945 1/1 1/3
PRINCETON UNIV N J DEPT OF AEROSPACE AND MECHANICAL SCIENCES

AN ANALYTICAL STUDY OF FACTORS INFLUENCING THE LONGITUDINAL STABILITY OF TILT-WING VTOL AIRCRAFT. (U)

JUL 66 108P BEPPU ,G. ;CURTISS,H. C. , JR;
REPT. NO. 756,
CONTRACT: DA-44-177-AMC-8(T),
PROJ: DA-1P125901A142
TASK: 1P125901A142-33
MONITOR: USAAVLABS TR-66-53

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, PITCH(MOTION)), STABILITY, ANALYSIS, TILT WINGS, HOVERING, TRANSPORT PLANES (U)
IDENTIFIERS: C-142 AIRCRAFT (U)

AN ANALYTICAL METHOD FOR PREDICTING THE STABILITY CHARACTERISTICS OF TILT-WING VTOL AIRCRAFT IN THE TRANSITION SPEED RANGE IS PRESENTED. SAMPLE CALCULATIONS BASED ON AN ASSUMED TILT-WING VTOL TRANSPORT CONFIGURATION OF THE XC-142A CLASS WITH DOUBLE SLOTTED FLAPS ARE GIVEN. PARTICULAR EMPHASIS IS PLACED ON THE SENSITIVITY OF THE RESULTS TO VARIOUS ASSUMPTIONS MADE IN THE ANALYSIS. THE CONTRIBUTIONS OF THE VARIOUS AIRCRAFT COMPONENTS AND THE AERODYNAMIC INTERACTIONS OF THE COMPONENTS TO THE STABILITY DERIVATIVES ARE DISCUSSED, AS WELL AS THE CHANGES IN THE CHARACTERISTIC MODES OF MOTION OF THE VEHICLE THAT RESULT FROM VARIATIONS IN THE STABILITY DERIVATIVES. THE TRIM CONDITIONS OF THE VEHICLE ARE SHOWN TO BE QUITE SENSITIVE TO THE PREDICTION OF THE FLAP CHARACTERISTICS. A LIMITED COMPARISON OF THE CALCULATED RESULTS WITH EXPERIMENTAL DATA OBTAINED FROM A DYNAMIC MODEL OF THE XC-142A, WHICH IS SOMEWHAT DISSIMILAR FROM THE ASSUMED CONFIGURATION, IS PRESENTED. THIS COMPARISON INDICATES THAT THE TRENDS OF THE STABILITY DERIVATIVES ARE CORRECTLY PREDICTED. THE AGREEMENT BETWEEN THEORY AND EXPERIMENT IS GOOD IN HOVERING; HOWEVER, AS THE WING INCIDENCE IS REDUCED, THE DIFFERENCE BETWEEN THEORY AND EXPERIMENT BECOMES QUITE LARGE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-641 371 1/1 1/3
AIR FORCE FLIGHT TEST CENTER EDWARDS AFB CALIF

IMPORTANT VSTOL AIRCRAFT STABILITY DERIVATIVES IN HOVER AND TRANSITION. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
OCT 66 27P RAMPY,J. M. ;
REPT. NO. FTC-TR-66-29

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, STABILITY), (*AERODYNAMIC CHARACTERISTICS, VERTICAL TAKE-OFF PLANES), HOVERING, FLIGHT, SIMULATORS, MATHEMATICAL ANALYSIS, MOTION, TEST FACILITIES (U)

TO DESIGN BETTER GROUND TEST FACILITIES AND TO SPECIFY HANDLING QUALITIES CRITERIA, THE AERODYNAMIC PARAMETERS INVOLVED MUST BE IDENTIFIED. THE PURPOSE OF THE STUDY WAS TO IDENTIFY THESE PARAMETERS FOR THE CRITICAL FLIGHT REGIME OF HOVER THROUGH TRANSITION. BOTH ANALOG AND DIGITAL COMPUTERS WERE USED. THE PURPOSE OF THE ANALOG SIMULATION WAS TO QUALITATIVELY ANALYZE THE BEHAVIOR OF VSTOL AIRCRAFT TO CONTROL INPUTS AND IDENTIFY THE MOST IMPORTANT DERIVATIVES. TWO TYPICAL VSTOL AIRCRAFT WERE INVESTIGATED. THE METHOD USED TO DETERMINE THE IMPORTANT DERIVATIVES WAS THAT OF VARYING THE STABILITY DERIVATIVES ABOUT SOME BASIC VALUE. THE AMOUNT OF SIMULATOR RESPONSE IDENTIFIED THE MOST IMPORTANT DERIVATIVES. NEXT, THE DIGITAL COMPUTER WAS USED TO AFFIX A MAGNITUDE TO THE RELATIVE IMPORTANCE OF EACH DERIVATIVE. TO ESTABLISH THE RELATIVE IMPORTANCE, A SENSITIVITY FACTOR WAS DERIVED. THE INFORMATION NECESSARY TO CALCULATE THIS FACTOR WAS OBTAINED FROM A MATHEMATICAL ANALYSIS OF THE EQUATIONS OF MOTION. THE IMPORTANT DERIVATIVES WERE IDENTIFIED FOR BOTH LONGITUDINAL AND LATERAL-DIRECTIONAL MOTION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-642 938 1/2
LTV AEROSPACE CORP DALLAS TEX LTV VOUGHT AERONAUTICS DIV

RESEARCH ON VTOL WATER HOVER EFFECTS, (U)

SEP 66 146P MARSH,K. R. ;
REPT. NO. 2-55400/6R-6090
CONTRACT: N00014-66-C0095

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, HOVERING), (*HOVERING, WATER), AMPHIBIAN PLANES, TRANSPORT PLANES, AIRPLANE MODELS, DOWNWASH, MODEL TESTS, PERFORMANCE(ENGINEERING) (U)
IDENTIFIERS: C-142 AIRCRAFT (U)

A SERIES OF TESTS WERE MADE WITH A POWERED MODEL OF THE XC-142A AIRPLANE HOVERING OVER GROUND AND OVER A WATER FILLED TANK. SIX COMPONENT MEASUREMENTS WERE MADE OF THE FORCES AND MOMENTS ACTING ON THE MODEL, MEASUREMENTS WERE MADE OF THE WATER SPRAY RECIRCULATED THRU THE OUTBOARD PROPELLER AND PICTURES WERE TAKEN OR THE SPRAY PATTERNS DEVELOPED. THE FORCE DATA SHOWED A SLIGHT REDUCTION IN MODEL NORMAL FORCE WHEN HOVERING OVER WATER RATHER THEN THE GROUND. THERE WAS CONSIDERABLE SCATTER IN THE MOMENT DATA. MEASUREMENTS OF SPRAY BEING RECIRCULATED THRU THE PROP WERE FOUND TO BE TOLERABLE EVEN AT THE MOST CRITICAL CONDITIONS. WHILE THERE WAS CONSIDERABLE SPRAY GENERATED BY THE DOWNWASH, IT WAS BLOWN AWAY FROM THE MODEL LEAVING THE MODEL RELATIVELY CLEAR OF SPRAY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-644 191 1/4 1/3
ARNOLD ENGINEERING DEVELOPMENT CENTER ARNOLD AIR FORCE STATION TENN

ON THE RELATIVE IMPORTANCE OF THE LOW SPEED CONTROL REQUIREMENT FOR V/STOL AIRCRAFT, (U)

DEC 66 30P GOLDBERGER,STEPHEN ;
REPT. NO. AEDC-TR-66-205
CONTRACT: AF 40(600)-1200
PROJ: ARO-BB3602

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH ARO, INC., TULLAHOMA, TENN.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FLIGHT SPEEDS), (*FLIGHT SPEEDS, FLIGHT CONTROL SYSTEMS), SHORT TAKE-OFF PLANES, STABILIZATION SYSTEMS, DESIGN, AERODYNAMIC CHARACTERISTICS, PILOTS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE CLOSED LOOP DYNAMIC RESPONSE OF A V/STOL AIRPLANE, PILOT, AND AUTOSTABILIZATION SYSTEM WAS STUDIED WITH THE PURPOSE OF DEMONSTRATING WHICH AIRPLANE PARAMETERS ARE MOST IMPORTANT IN DETERMINING THE AIRPLANE'S LOW SPEED FLIGHT CHARACTERISTICS. THE INFLUENCE OF THE STABILITY AUGMENTATION SYSTEM WAS FOUND TO BE SO GREAT THAT THE OTHER PARAMETERS ARE SMALL BY COMPARISON. THE MOST IMPORTANT STABILITY AND CONTROL PARAMETER IN LOW SPEED, V/STOL AIRCRAFT FLIGHT, THEREFORE, IS CONTROL POWER. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-645 997 1/3
GENERAL ELECTRI' CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT.

PRELIMINARY SYSTEMS ANALYSIS AND SIMULATION. (U)

SEP 63 225P
REPT. NO. 127
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-645 999.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, SIMULATION), (*RESEARCH PLANES, SIMULATION), ANALYSIS, HOVERING, FLIGHT, STABILIZATION SYSTEMS, TESTS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE ANALOG WORK PERFORMED INCLUDED THE SIX-DEGREE-OF-FREEDOM HOVER SIMULATION; THE LONGITUDINAL THREE-DEGREE-OF-FREEDOM TRANSITION SIMULATION; THE LONGITUDINAL THREE-DEGREE-OF-FREEDOM CONVERSION SIMULATION, THE SIX-DEGREE-OF-FREEDOM PERTURBATION CONVENTIONAL FLIGHT SIMULATION, AND THE SIMULATION OF GAS GENERATOR CONTROL FOR WING-FAN THRUST. SUPPORTING ANALYSES INCLUDED ROLL-YAW COUPLING AND STRUCTURAL FEEDBACK IN THE PITCH MODE. FURTHER WORK ACCOMPLISHED INVOLVED THE STABILITY AUGMENTATION SYSTEM SPECIFICATION; THE DEVELOPMENT OF THE BRIDGE CONCEPT FOR ROLL AND YAW LOUVER CONTROL; SUPPORT OF VARIOUS HARDWARE TESTS; THE GENERATION OF THE SPECIFICATION FOR THE DEFLOREZ POINT LIGHT SOURCE VISUAL DISPLAY; FURNISHING CONSOLATION SERVICES DURING THE DEFLOREZ DISPLAY INSTALLATION AND TESTING, AND DEVELOPING THE YAW, ROLL AND PITCH DIRECTION COSINE RELATIONSHIPS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-645 998 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

INSTALLED SYSTEMS FUNCTIONAL TEST SUMMARY. (U)

MAR 64 21P
REPT. NO. 148
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, TESTS), (*RESEARCH PLANES, TESTS), HOVERING, FLIGHT, LIFT, AIRCRAFT ENGINES, PROPULSION (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE THE XV-5A AIRCRAFT S/N 24506 WAS GROUND TESTED IN ALL AREAS PERTAINING TO HOVER, FORWARD FAN SUPPORTED FLIGHT, AND LOW SPEED CONVENTIONAL FLIGHT AND IS ACCEPTABLE TO PROCEED INTO ACTIVE FLIGHT TESTING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-645 999 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

NOSE LANDING GEAR DROP TEST REPORT. (U)

MAR 65 23P
REPT. NO. 155
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-645 997.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, LANDING GEAR), (*RESEARCH PLANES, LANDING GEAR), (*LANDING GEAR, DROP TESTING), NOSE WHEELS, SHOCK ABSORBERS, LOADING(MECHANICS) (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE RESULTS OF THE TESTS DEMONSTRATE SATISFACTORY ENERGY ABSORBTION CHARACTERISTICS OF THE SHOCK ABSORBER. THE FIRST TEST CONDITION RESULTS MEETS THE REQUIREMENTS OF THE DEVIATION ALLOWANCE. THE VERTICAL REACTION EXCEEDS THE ORIGINAL REQUIREMENTS FOR APPROXIMATELY .05 SECONDS AT A STRUT STROKE OF 4.15 INCHES WITH A MAXIMUM OF 6600 POUNDS. THE SECOND CONDITION RESULTS MEETS THE TEST REQUIREMENTS. THE OFFICIAL TEST FOR CONDITION THREE WAS RUN WITH AN ADDITIONAL 200 POUNDS ON THE JIG THAT WAS ANTICIPATED TO CORRECT FOR FRICTION IN THE DROP TOWER. THE RESULTS INDICATE, HOWEVER, EXCESSIVE ENERGY INPUT. A PRIOR RUN IS ALSO INCLUDED WITH THE CORRECT JIG WEIGHT AND WITH INSUFFICIENT ENERGY INPUT TO SHOW THE EFFECT OF THE WEIGHT CHANGE. BOTH RUNS ARE WELL WITHIN THE MAXIMUM ALLOWABLE VERTICAL REACTION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-646 000 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED TECHNOLOGY AND DEMONSTRATOR PROGRAMS DEPT

FLUTTER MODEL TEST REPORT. (U)

JUN 66 21P
REPT. NO. 168
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, MODEL TESTS), (*RESEARCH PLANES, MODEL TESTS), (*FLUTTER, WING-BODY CONFIGURATIONS), AILERONS, ROTATION, FREQUENCY, LIFT, PROPULSION (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE REPORT COVERS THE WIND-TUNNEL TESTING, IN THE FLUTTER REGIME OF A DYNAMICALLY SIMILAR MODEL OF THE XV-5A LIFT-FAN RESEARCH AIRCRAFT. THE TEST WAS RESTRICTED ENTIRELY TO AN INVESTIGATION OF THE WING-FUSELAGE COMBINATION AND AS SUCH NO EMPENNAGE WAS REPRESENTED. TEST OBJECTIVES WERE SLANTED TOWARD VERIFICATION OF PREVIOUS ANALYTICAL INVESTIGATIONS WITH CLOSE ATTENTION PAID TO UNCOVERING ANY TRANSONIC EFFECTS WHICH MIGHT HAVE BEEN CRUDELY REPRESENTED ANALYTICALLY. THE TESTS WERE COMPLETED TO THE POINT OF ACHIEVING A 5 PERCENT MARGIN ON EQUIVALENT SPEED FOR THE HIGHEST AILERON ROTATIONAL FREQUENCY STUDIED, APPROXIMATELY 18.9 CPS. ONE ACTUAL CASE OF FLUTTER OCCURRED, AT M = 0.75 AND AT A DYNAMIC PRESSURE (Q) OF APPROXIMATELY 600 PSF FOR AN AILERON ROTATIONAL FREQUENCY OF 14.9 CPS. A SECOND CASE OF FLUTTER OCCURRED AT M = 0.75 AND A Q GREATER THAN 600 PSF F/ AN AILERON ROTATIONAL FREQUENCY OF 16.1 CPS; HOWEVER, THIS LATTER CASE OF FLUTTER WAS NOT CONSIDERED VALID DUE TO THE APPARENT FATIGUING OF AN AILERON SPRING BRACKET, RESULTING IN ESSENTIALLY A FREE-FLOATING SURFACE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH-CONTROL NO. /ZDM07

AD-646 280 1/3 14/4
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

PRELIMINARY RELIABILITY REPORT. (U)

AUG 63 72P
REPT. NO. 125
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-646 289.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, RELIABILITY), (*RESEARCH PLANES, RELIABILITY), PROPULSION, LIFT, FANS, STRESSES, CONTROL (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

CONTENTS: XV-5A RELIABILITY PROGRAM; X353-5B AND X376 PROPULSION; AIRCRAFT SUB-CONTRACTORS RELIABILITY PROGRAM. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-646 281 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

STRUCTURAL DESIGN LOADS. (U)

MAR 64 319P
REPT. NO. 143
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-646 280.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, LOADING(MECHANICS)), (*RESEARCH PLANES, LOADING(MECHANICS)), DESIGN, STRUCTURAL PARTS, MANEUVERABILITY, AEROELASTICITY, LIFT, FANS, PROPULSION (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE REPORT SHOWS THE METHODS OF ANALYSIS, CALCULATED DESIGN LOADS, MANEUVERING TIME-HISTORIES, AEROELASTIC CHARACTERISTICS AND A COMPILATION OF OTHER PERTINENT CHARACTERISTIC LOADING DATA. THE ANALYSES EXTENSIVELY UTILIZED XV-5A WIND-TUNNEL MODEL DATA AND MECHANIZED DIGITAL COMPUTER (IBM 704) PROGRAMS. FROM THESE STUDIES, AIRFRAME STRENGTH REQUIREMENTS WERE DEVELOPED. PROGRESSIVE PARAMETRIC EVALUATION OF THE AIRPLANE'S INHERENT CAPABILITIES THEN SERVED TO CORROBORATE THE AIRFRAME STRUCTURAL INTEGRITY OR, AS FOR ONE PARTICULAR MANEUVER, DEFINED SAFE FLIGHT-ENVELOPE OPERATING LIMITS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-646 282 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

MAIN LANDING GEAR DROP TEST REPORT. (U)

MAR 64 25P
REPT. NO. 147
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-646 281.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, LANDING GEAR), (*RESEARCH PLANES, LANDING GEAR), (*LANDING GEAR, DROP TESTING), LIFT, FANS, PROPULSION, EXPERIMENTAL DATA, SHOCK ABSORBERS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE SHOCK ABSORBER PORTION OF THE 1510L100 MAIN LANDING GEAR, BUT USING A DUMMY CYLINDER, WAS TESTED ON 2 AUGUST 1963, IN ACCORDANCE WITH THE H. W. LOUD TEST PROCEDURE 1510LTP-4, REVISION 'A'. THE REPORT PRESENTS THE SUCCESSFUL COMPLETION OF THE ESTABLISHED TEST REQUIREMENTS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-646 283 1/3 20/4
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

PREDICTED VIBRATION AND ACOUSTIC ENVIRONMENTAL STUDY. (U)

OCT 64 31P
REPT. NO. 152
CONTRACT: DA-44-177-TC-715

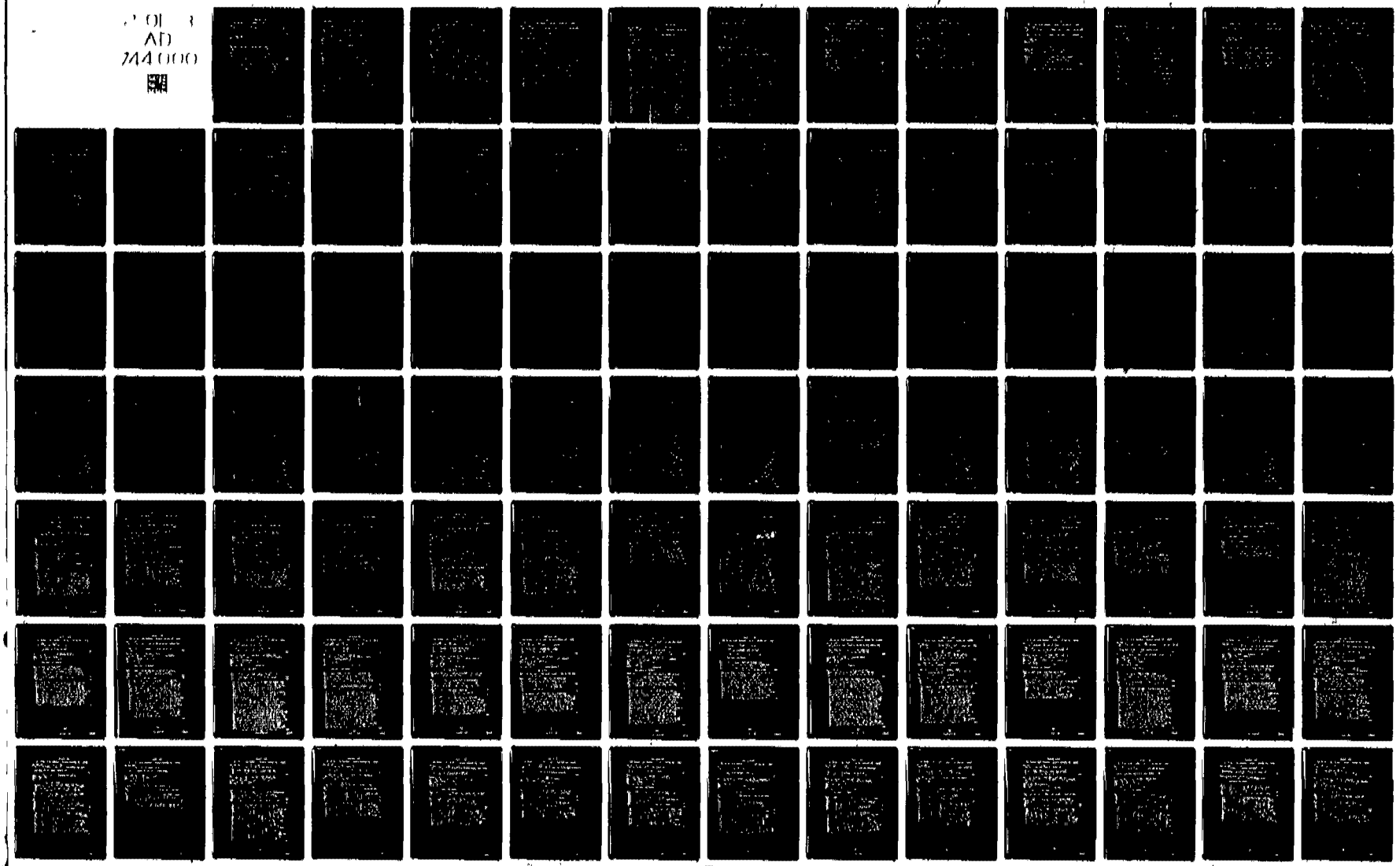
UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-646 282.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, AEROELASTICITY), (*RESEARCH PLANES, AEROELASTICITY), VIBRATION, LIFT, FANS, PROPULSION, ACOUSTICS, FATIGUE(MECHANICS), FAILURE(MECHANICS), AIRPLANE PANELS, DESIGN (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE ANALYSIS INDICATES THAT THE PROPOSED WING SKIN PANELS WILL NOT EXPERIENCE FATIGUE FAILURE AS A RESULT OF ACOUSTIC EXCITATION SUSTAINED DURING THE 250 HOUR DESIGN LIFE OF THE AIRCRAFT. THE VIBRATION ENVIRONMENT OF THE AIRCRAFT IS EXPECTED TO BE SIMILAR TO THAT OF OTHER JET AIRCRAFT OF COMPARABLE RATED THRUST. BASED ON THE ANTICIPATED VIBRATION LEVELS AND THE RELATIVELY SHORT DESIGN LIFE OF THE AIRCRAFT, COMPONENTS THAT MAY BE SUBJECTED TO SIGNIFICANT OSCILLATORY LOAD SHOULD BE INVESTIGATED FOR FATIGUE ON AN INDIVIDUAL BASIS BY THE DESIGN GROUP INVOLVED. (AUTHOR) (U)

AD-744 000 DEFENSE DOCUMENTATION CENTER ALEXANDRIA VA F/G 1/3
VERTICAL TAKE-OFF PLANES.(U)
JUN 72
UNCLASSIFIED DDC-TAS-72-46 NL



DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-646 289 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

X353-5B AND X376 DESIGN SUMMARY REPORT. (U)

JUL 65 107P
REPT. NO. 161
CONTRACT: DA-34-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-646 284.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FANS), (*RESEARCH PLANES, FANS), DESIGN, LIFT, PROPULSION, COMPATIBILITY, AERODYNAMIC CHARACTERISTICS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

INSTALLATION STUDIES FOR COMPATIBILITY OF THE X353-5B AND X376 PROPULSION SYSTEMS TO THE XV-5A AIRCRAFT ARE DESCRIBED AS WELL AS THE AERODYNAMIC MECHANICAL DESIGN ASPECTS OF HE LIFT FAN SYSTEM. DISCUSSIONS ARE CENTERED AROUND THE CHANGES TO THE FANS DEVELOPED BEYOND CONTRACT DA 44-177-TC-584. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-647 367 1/3 21/5
HUGHES TOOL CO CULVER CITY CALIF AIRCRAFT DIV

20-HOUR FOLLOW-ON FLIGHT TEST PROGRAM, XV-9A HOT CYCLE RESEARCH AIRCRAFT. (U)

DESCRIPTIVE NOTE: SUMMARY REPT., 17 MAR-23 DEC 65, DEC 66 22UP PIEPER,C. W. ;HIRSH,N. B. ;
REPT. NO. HTC-AD-66-4
CONTRACT: DA-44-177-AMC-225(T)
TASK: 1M131001D15701
MONITOR: USAAVLABS TR-66-81

UNCLASSIFIED REPORT

DESCRIPTORS: (*RESEARCH PLANES, FLIGHT TESTING), (*VERTICAL TAKE-OFF PLANES, FLIGHT TESTING), (*ROTARY WINGS, PERFORMANCE(ENGINEERING)), PROPULSION, COOLING, LOADING(MECHANICS), NOZZLE GAS FLOW, HELICOPTER ROTORS, GAS GENERATING SYSTEMS (U)
IDENTIFIERS: V-9 AIRCRAFT, HOT CYCLE PROPULSION SYSTEMS (U)

THE REPORT SUMMARIZES ADDITIONAL TECHNICAL DATA FOR EVALUATION OF HOT CYCLE PROPULSION SYSTEM PERFORMANCE AND OPERATING CHARACTERISTICS. THE TESTS WERE PERFORMED FROM 30 APRIL THROUGH 26 AUGUST 1965 AND INCLUDED AN EVALUATION OF THE PERFORMANCE, STRUCTURAL QUALITIES, AND STABILITY AND CONTROL OF THE HOT CYCLE ROTOR AND PROPULSION SYSTEM IN GREATER DEPTH THAN THAT PRACTICAL DURING THE INITIAL 15-HOUR FLIGHT TEST. THE 20 HOURS OF FLIGHT TESTING INVOLVED EXPANSION OF FLIGHT ENVELOPE AND INCLUDED EVALUATION OF AIRCRAFT AND ROTOR SYSTEM PERFORMANCE: FLIGHT LOADS, COOLING, AND FLYING QUALITIES IN VARIOUS FLIGHT MODES. A GROUND TEST OF THE TETHERED ROTOR SYSTEM WAS PERFORMED AT THE CONCLUSION OF FLIGHT TESTING, FOLLOWED BY A TEARDOWN INSPECTION OF THE AIRCRAFT. THE TEARDOWN INSPECTION WAS COMPLETED ON 23 DECEMBER 1965. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-647 383 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

LANDING GEAR CRITERIA GROUND LOADS AND REACTIONS. (U)

OCT 63 151P
REPT. NO. 131
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, LANDING GEAR); (*RESEARCH PLANES, LANDING GEAR); (*LANDING GEAR, LOADING(MECHANICS)), LANDING IMPACT, AIRCRAFT LANDINGS, COMPUTER PROGRAMS, FUSELAGES, TAXIING, LIFT, FANS, PROPULSION (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE MAIN LANDING GEAR IS PROVIDED WITH A TWO-POSITION FEATURE: THE POSITION FORWARD FOR CONVENTIONAL LANDING, AND THE POSITION AFT FOR VERTICAL LANDING. CRITERIA WAS GENERATED FOR BOTH CONVENTIONAL AND VERTICAL LANDING. CALCULATIONS OF GROUND LOADS WERE BASED ON METHODS IN MIL-A-8862. A COMPUTER PROGRAM WAS DEVELOPED WHICH PROVIDES FUSELAGE REACTIONS AND INTERNAL MEMBER LOADS FOR ALL LANDING AND TAXIING CONDITIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-647 364 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

EMPENNAGE STRESS ANALYSIS REPORT. (U)

NOV 63 144P
REPT. NO. 132
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, TAILS(AIRCRAFT)), (*RESEARCH PLANES, TAILS(AIRCRAFT)), (*TAILS(AIRCRAFT) STRESSES), MATHEMATICAL ANALYSIS, LOADING(MECHANICS), LIFT, FANS, PROPULSION (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THIS REPORT PRESENTS THE STRESS ANALYSIS OF THE MODEL XV-5A EMPENNAGE. THE STRUCTURE ANALYZED INCLUDES THE HORIZONTAL AND VERTICAL STABILIZERS, AND THE ELEVATOR AND RUDDER. THE ANALYSES, WHICH ARE INTENDED TO PROVIDE SUMMARY TYPE INFORMATION, INCLUDE CRITICAL LOADING DATA; COMPUTATION OF INTERNAL STRESSES AND SHEARS, AND BRIEF DETAILED ANALYSES TO FIND MARGINS OF SAFETY OF THE MAJOR COMPONENTS. THE EMPENNAGE WAS SUCCESSFULLY PROOF TESTED TO LIMIT LOAD. CONDITIONS F-12 AND F-13 WERE COMBINED TO PRODUCE THE CRITICAL SYMMETRICAL CONDITION. THE CRITICAL UNSYMMETRICAL ROLLING MOMENT OF CONDITION AF-6 WAS APPLIED DURING THE FUSELAGE UNSYMMETRICAL TEST CONDITION. ALL LOADS ARE ULTIMATE VALUES, UNLESS OTHERWISE STATED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-647 386 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

WIND TUNNEL TEST REPORT, LIFT FAN POWERED SCALE MODEL. (U)

NOV 63 162P
REPT. NO. 137
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, MODEL TESTS), (*RESEARCH PLANES, MODEL TESTS), AERODYNAMIC CHARACTERISTICS, GROUND EFFECT, FLIGHT, HOVERING, FANS, LIFT, PROPULSION, WINGS, WIND TUNNELS, STATICS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

DATA WERE OBTAINED TO DEFINE THE STATIC CHARACTERISTICS IN AND OUT OF GROUND EFFECT; AERODYNAMIC CHARACTERISTICS IN FORWARD FLIGHT FOR THE TRANSITION, CONVERSION, AND LOW SPEED CONVENTIONAL FLIGHT MODES; AND FLIGHT CHARACTERISTICS AT LOW TRANSLATIONAL SPEEDS NEAR HOVERING IN VERTICAL, LATERAL, AND REARWARD DIRECTIONS. IN ADDITION, WING SURFACE STATIC PRESSURES AND WING FAN INLET CLOSURE DOOR HINGE MOMENTS WERE MEASURED. THE DATA INDICATE AN ADVERSE GROUND EFFECT ON STATIC LIFT AT HEIGHTS LESS THAN 2 WING FAN DIAMETERS WITH A REDUCTION OF APPROXIMATELY 6% AT 1.0 DIAMETER. A CORRESPONDING REDUCTION IN FAN POWER AT CONSTANT FAN RPM COMPENSATES FOR THE LIFT REDUCTION IF OPERATION AT CONSTANT POWER IS CONSIDERED. THE EFFECTS OF WING FAN AND NOSE FAN OPERATION ARE DESTABILIZING WITH RESPECT TO ANGLE OF ATTACK. NOSE FAN OPERATION IS SLIGHTLY DESTABILIZING IN YAW, BUT THE DATA INDICATE POSITIVE LATERAL-DIRECTIONAL STABILITY FOR THE ENTIRE RANGE OF THRUST COEFFICIENT IN FAN-POWERED FLIGHT. A FAVORABLE GROUND EFFECT ON LIFT IS OBTAINED WITH INCREASING FORWARD SPEED AS WOULD OCCUR DURING SHORT TAKE-OFF OPERATION, WITH AN INCREASE OF APPROXIMATELY 22% ABOVE THE OUT-OF-GROUND EFFECT LIFT AT A THRUST COEFFICIENT OF .885. THE DATA OBTAINED IN GROUND EFFECT WERE UNCORRECTED FOR WALL EFFECTS BUT THIS CORRECTION IS BELIEVED TO BE SMALL COMPARED WITH THE LIFT INCREASE SHOWN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-647 387 1/3 21/5
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

CALCULATED INSTALLED POWER PLANT PERFORMANCE. (U)

SEP 64 228P
REPT. NO. 150
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-647 386.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, TURBOJET ENGINES), (*RESEARCH PLANES, TURBOJET ENGINES), (*TURBOJET ENGINES, PERFORMANCE(ENGINEERING)), LIFT, FANS, PROPULSION, THRUST, DRAG, EXHAUST GASES, TEMPERATURE (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE REPORT PRESENTS CALCULATED INSTALLED PERFORMANCE CHARACTERISTICS FOR THE U. S. ARMY XV-5A PROPULSION SYSTEM. THE PROPULSION SYSTEM CONSISTS OF TWO GENERAL ELECTRIC X353-5B POWER-PLANTS, ONE G. E. X376 PITCH CONTROL FAN, AND ASSOCIATED DUCTING, CONTROLS AND ACCESSORY EQUIPMENT. INSTALLED PERFORMANCE OF TURBOJET MODE IS PRESENTED FOR ARDC STANDARD DAY AND ANA 421 HOT DAY FOR ONE AND TWO ENGINE OPERATION. PERFORMANCE DATA INCLUDE GROSS THRUST, PROPULSION SYSTEM DRAG, NET THRUST, FUEL FLOW AND COOLING SYSTEM DRAG. A SEA LEVEL STATIC THRUST OF 4,920 POUNDS IS ESTIMATED FOR AN ARDC STANDARD DAY. FOR ANA 421, HOT DAY CONDITIONS AT 2,500 FEET ALTITUDE, STATIC THRUST IS 4,250 POUNDS. A DETAILED ANALYSIS OF J85 ENGINE OPERATION AT NEAR IDLE CONDITION (47% TO 60% RPM) SHOWED THAT EXHAUST GAS TEMPERATURE INCREASED RAPIDLY WITH INCREASING ENGINE AIR INLET TEMPERATURE AND SHAFT POWER EXTRACTION. THUS, TO PRECLUDE EXCEEDING EXHAUST GAS TEMPERATURE LIMITS, DUE TO REINGESTION OF HOT ENGINE EXHAUST GASES AND/OR VARYING POWER EXTRACTION FOR SYSTEM CHECKOUT, A MINIMUM RPM OF 70% FOR THE J85 ENGINES IS RECOMMENDED FOR XV-5A FAN MODE OPERATION. THE ENGINE AIR INLET SHOWS EXCELLENT PERFORMANCE THROUGHOUT ITS REQUIRED OPERATING ENVELOPE. A MINIMUM TOTAL PRESSURE RECOVERY OF 98.48 IS AVAILABLE FOR STATIC OPERATION, (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-647 394 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

ONE-FIFTH SCALE INLET MODEL WIND TUNNEL TEST REPORT, VOLUME I. (U)

MAR 65 246P
REPT. NO. 154-VOL-1
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-647 395.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, MODEL TESTS), (*RESEARCH PLANES, MODEL TESTS), WIND TUNNEL MODELS, AIRPLANE MODELS, INSTRUMENTATION, TABLES, TEST EQUIPMENT, LIFT, FANS, PROPULSION (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

SUMMARY TABLES, GRAPHS, MODEL DESCRIPTION, INSTRUMENTATION, CONDITIONS TESTED, VALIDITY OF DATA AND OTHER INFORMATION ARE PRESENTED. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-647 395 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

ONE-FIFTH SCALE INLET MODEL WIND TUNNEL TEST REPORT, VOLUME II. (U)

MAR 65 61UP
REPT. NO. 154-VOL-2
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-647 394, AD-649 396.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, MODEL TESTS), (*RESEARCH PLANES, MODEL TESTS), TABLES, WIND TUNNEL MODELS, AIRPLANE MODELS, LIFT, FANS, PROPULSION, SUBSONIC CHARACTERISTICS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

TABULATED DATA ARE PRESENTED FOR THE LOW SPEED TESTS (MACH 0 TO 0.2). (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-647 396 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

ONE-FIFTH SCALE INLET MODEL WIND TUNNEL TEST REPORT, VOLUME III. (U)

MAR 65 25UP
REPT. NO. 154-VOL-3
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-647 395.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, MODEL TESTS), (*RESEARCH PLANES, MODEL TESTS), TABLES, WIND TUNNEL MODELS, AIRPLANE MODELS, LIFT, FANS, PROPULSION, SUBSONIC CHARACTERISTICS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

TABULATED DATA ARE PRESENTED FOR THE HIGH SPEED TESTS (MACH 0.4 TO 0.85). (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-648 006 1/3 21/5
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS FOR X353-5B AND X376 FANS. (U)

66 42/P
REPT. NO. 124
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FANS), (*RESEARCH PLANES, FANS), (*FANS, PROPULSION), TURBOJET ENGINES, LIFT, OPERATION, MAINTENANCE, INSTRUCTION MANUALS, ASSEMBLING (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE X353-5B PROPULSION SYSTEM CONSISTS OF A J85-GE-5 TURBOJET ENGINE (LESS AFTERBURNER) USED AS A GAS GENERATOR, A DIVERTER VALVE TO DIRECT THE GAS FLOW, AND AN X353-5B LIFT FAN EQUIPPED WITH VECTORABLE DISCHARGE LOUVERS. THE X376 PITCH TRIM CONTROL FAN DERIVES ITS POWER FROM TURBINE DISCHARGE BLEED OF J85-GE-5 TURBOJET ENGINES (LESS AFTER-BURNERS). THE X376 IS A PARTIAL ADMISSION TIP TURBINE-DRIVEN FAN WHICH IS CONNECTED TO THE J85 ENGINES THROUGH AIRFRAME-PROVIDED DUCTING. THE FAN EMPLOYS TWO SEPARATE SCROLLS CONTAINING THE TURBINE INLET NOZZLES; THIS FEATURE PROVIDES FOR ONE-ENGINE-OUT OPERATION. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-646 007 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

STRESS REPORT, NOSE LANDING GEAR ASSEMBLY. (U)

NOV 63 318P
REPT. NO. 133
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, LANDING GEAR), (*RESEARCH PLANES, LANDING GEAR), (*LANDING GEAR, STRESSES), NOSE WHEELS, MECHANICAL FASTENERS, FANS, LIFT, PROPULSION (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE REPORT CONSISTS OF DATA SUBSTANTIATING THE STRUCTURAL INTEGRITY OF THE NOSE LANDING GEAR ASSEMBLY AND THE TRUNNION PINS REQUIRED FOR ATTACHMENT TO THE AIRPLANE. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-651 099 20/4 1/3
DAVID TAYLOR MODEL BASIN WASHINGTON D C AERODYNAMICS LAB

WIND-TUNNEL INVESTIGATIONS OF A 1/20-SCALE POWERED MODEL OPEN-OCEAN V/STOL SEAPLANE. (U)

DESCRIPTIVE NOTE: SUMMARY REPT.,
JAN 67 49P THOMAS,RICHARD O. ;
REPT. NO. DTMB-2181, DTMB-AERO-1:06

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEAPLANES, MODEL TESTS), (*VERTICAL TAKE-OFF PLANES, AERODYNAMIC CHARACTERISTICS), CONVERTIBLE PLANES, FLIGHT, STALLING, WING-BODY CONFIGURATIONS, CANARD CONFIGURATION, CENTER OF GRAVITY, TILT WINGS, DESIGN, HOVERING (U)

LOW-SPEED WIND-TUNNEL TESTS WERE CONDUCTED ON A 1/20-SCALE POWERED MODEL OF A PROPOSED OPEN-OCEAN V/STOL SEAPLANE DESIGN. HOVER AND TRANSITION POWER REQUIRED AND CLIMB AND DESCENT SPEEDS AT VARIOUS FLIGHT PATH ANGLES WERE DETERMINED. THE EFFECT OF FULL-SPAN SPOILERS ON WING AND CANARD STALLING CHARACTERISTICS THROUGH TRANSITION WAS BRIEFLY INVESTIGATED. A COMPARISON OF CRUISE PERFORMANCE OF THE SEAPLANE AND A CONVENTIONAL TRANSPORT OF EQUIVALENT SIZE WAS MADE. AFTER CORRECTION OF THE SEAPLANE MODEL CRUISE LIFT CURVE AND DRAG POLAR TO FULL-SCALE REYNOLDS NUMBER, CRUISE PERFORMANCE OF THE SEAPLANE WAS FOUND TO COMPARE FAVORABLY WITH THAT OF THE CONVENTIONAL MONOPLANE. IN THE TRANSITION MODE, THE MODEL IS LONGITUDINALLY UNSTABLE AT HIGH WING TILTS AND DIRECTIONALLY STABLE AT ALL WING TILTS FOR THE INITIAL CENTER-OF-GRAVITY LOCATION. WITH THE PRESENT RELATIONSHIP OF WING, CANARD, AND CENTER OF GRAVITY, THE MODEL CANNOT BE TRIMMED IN PITCH BY VARYING ONLY INCIDENCE OF THE CANARD WITH UNIFORM THRUST SETTING ON ALL ENGINES. DIFFERENTIAL THRUST, THE MECHANISM ENVISIONED FOR HOVER CONTROL, IS NECESSARY FOR PITCH TRIM AND CONTROL THROUGHOUT MOST OF THE TRANSITION MODE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-653 563 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

FUSELAGE STRUCTURAL ANALYSIS. VOLUME 1. SHEAR AND BENDING. (U)

FEB 64 23[illegible]P
REPT. NO. 144-V[illegible]-1
CONTRACT: DA-4[illegible] 177-1C-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO VOLUME 2, AD-653 564.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FUSELAGES), (*RESEARCH PLANES, FUSELAGES), (*FUSELAGES, STRUCTURAL PROPERTIES), SHEAR STRESSES, BENDING, LIFT, DUCTED FANS, ANALYSIS, LOADING(MECHANICS), TABLES (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE FINAL STRESS ANALYSIS OF THE U. S. ARMY XV-5A LIFT FAN RESEARCH AIRCRAFT FORWARD AND AFT FUSELAGE SECTIONS IS PRESENTED. THE FORWARD AND AFT SECTIONS OF THE FUSELAGE ARE CONVENTIONAL AIRCRAFT SEMI-MONOCOQUE STRUCTURES, AND THE CENTER SECTION IS A WELDED TUBULAR SPACE TRUSS. THE ANALYSIS OF THE LONGITUDINAL BENDING MEMBERS AND SKINS OR WEBS IS CONTAINED. THE PRIMARY INTENT OF THE REPORT IS TO PROVIDE A TABULATION OF INTERNAL SHEAR AND BENDING STRESS DISTRIBUTIONS FOR THE FINAL CRITICAL LOADING CONDITIONS. CRITICAL MARGINS OF SAFETY OF PRIMARY COMPONENTS ARE COMPUTED. STRUCTURAL ADEQUACY WAS ALSO DEMONSTRATED BY PROOF TESTS SIMULATING THE CRITICAL CONDITIONS. ALL LOADS SHOWN ARE ULTIMATE VALUES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-653 564 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

FUSELAGE STRUCTURAL ANALYSIS. VOLUME II. CENTER FUSELAGE AND ENGINE MOUNTS. (U)

FEB 64 438P
REPT. NO. 144-VOL-2
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO VOLUME 1, AD-653 563.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FUSELAGES), (*RESEARCH PLANES, FUSELAGES), (*FUSELAGES, STRUCTURAL PROPERTIES), (*ENGINE MOUNTS, STRUCTURAL PROPERTIES), AIRCRAFT ENGINES, ANALYSIS, LIFT, DUCTED FANS, PROPULSION, SUPPORTS, LOADING(MECHANICS), ENGINE STRUCTURES, EXHAUST PIPES, TABLES (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE STRUCTURAL ANALYSES OF THE FUSELAGE SPACE FRAME, ENGINE MOUNTS AND THE PROPULSION SYSTEM SUPPORTS OF THE U. S. ARMY XV-5A LIFT FAN RESEARCH AIRCRAFT ARE PRESENTED. THE SPACE FRAME INTERNAL LOADS ANALYSIS WAS PERFORMED UTILIZING THE IBM 704 COMPUTER PROGRAM DEVELOPED IN CONJUNCTION WITH THE XV-5A WING BASIC COMPONENTS ANALYSIS. THEREFORE, MUCH OF THE REPORT IS MADE UP OF THE DEFLECTIONS AND INTERNAL MEMBER LOADS PROGRAM OUTPUT FOR THE SEVERAL LOADING CONDITIONS INVESTIGATED. THE SPACE FRAME MEMBER CRITICAL LOADS ARE SUMMARIZED AND MEMBER ALLOWABLES AND MARGINS OF SAFETY ARE PRESENTED. THE PROPULSION SYSTEM, INCLUDING CROSSOVER DUCTS, TAILPIPE AND FORWARD ENGINE SUPPORT IS REVIEWED AND SUPPORTING STRUCTURE ANALYZED FOR CRITICAL LOADING CONDITIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOMO7

AD-653 565 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

STRUCTURAL ANALYSIS WING BASIC COMPONENTS. (U)

OCT 63 398P
REPT. NO. 130
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, WINGS), (*RESEARCH PLANES, WINGS), (*WINGS, STRUCTURAL PROPERTIES), ANALYSIS, LIFT, DUCTED FANS, STRUCTURAL PARTS, STRESSES, LOADING(MECHANICS), TABLES (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE STRUCTURAL ANALYSIS OF THE BASIC WING COMPONENTS OF THE U. S. ARMY XV-5A LIFT FAN RESEARCH AIRCRAFT IS PRESENTED. THE BASIC STRUCTURAL COMPONENTS OF THE WING ARE COMPOSED OF THE TWO SPARS, THE WING LEADING EDGE TORQUE BOX, AND THE SKINS AND RIBS OF THE PANEL OUTBOARD OF THE LIFT FAN. A COMPLETE DIGITAL COMPUTER PROGRAM APPLICABLE TO THIS AND OTHER HIGHLY REDUNDANT STRUCTURES WAS DEVELOPED. SINCE THIS PROGRAM WAS USED IN THE STRUCTURAL ANALYSIS AND DESIGN, THE DEFLECTIONS, INTERNAL LOADS, AND INTERNAL STRESSES FOR CRITICAL FLIGHT CONDITIONS ARE SUMMARIZED IN THE FORM OF PRINTED COMPUTER OUTPUT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-653 566 1/1 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

WIND TUNNEL TEST REPORT CONVENTIONAL MODEL. VOLUME I. LOW SPEED FORCE AND MOMENT DATA. (U)

JAN 64 414P
REPT. NO. 141-VOL-1
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO VOLUME 2, AD-653 568 AND VOLUME 3, AD-653 569.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, SUBSONIC CHARACTERISTICS), (*RESEARCH PLANES, MODEL TESTS), WIND TUNNEL MODELS, DUCTED FANS, LIFT, FORCE(MECHANICS), MOMENTS, TABLES (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE REPORT PRESENTS THE RESULTS FROM THE WIND TUNNEL TESTS OF A 1/8-SCALE CONVENTIONAL MODEL OF THE U. S. ARMY XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT. THE TESTS WERE PERFORMED TO DETERMINE THE SUBSONIC AERODYNAMIC CHARACTERISTICS OF THE XV-5A IN ITS CONVENTIONAL FLIGHT CONFIGURATION. VOLUME I CONTAINS THE TABULATED FORCE AND MOMENT DATA FROM THE LOW SPEED (M = 0.285) TESTS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-653 566 1/1 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

WIND TUNNEL TEST REPORT CONVENTIONAL MODEL. VOLUME II. LOW SPEED PRESSURE AND HINGE MOMENTS. (U)

JAN 64 344P
REPT. NO. 141-VOL-2
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO VOLUME 1, AD-653 566 AND VOLUME 3, AD-653 569.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, MODEL TESTS), (*RESEARCH PLANES, MODEL TESTS), MOMENTS, PRESSURE, WIND TUNNEL MODELS, LIFT, DUCTED FANS, TABLES, AERODYNAMIC CONTROL SURFACES, AERODYNAMIC CHARACTERISTICS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE REPORT PRESENTS THE RESULTS FROM WIND TUNNEL TESTS OF A ONE-EIGHTH SCALE CONVENTIONAL MODEL OF THE U. S. ARMY XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT. VOLUME II PRESENTS HINGE MOMENT COEFFICIENTS AND PRESSURE DATA IN PLOTTED AND TABULAR FORM WITH PERTINENT DETAIL EXPLANATORY INFORMATION. PRESSURE AND HINGE MOMENT DATA WERE NOT RECORDED DURING THE SECOND PHASE OF THE LOW SPEED TESTING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-653 569 1/1 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

WIND TUNNEL TEST REPORT CONVENTIONAL MODEL. VOLUME III. HIGH SPEED (MACH = 0.4 TO 0.9). (U)

JAN 64 547P
REPT. NO. 141-VOL-3
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO VOLUME 1, AD-653 566 AND VOLUME 2, AD-653 568.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, SUBSONIC CHARACTERISTICS), (*RESEARCH PLANES, MODEL TESTS), WIND TUNNEL MODELS, LIFT, DUCTED FANS, AERODYNAMIC CONTROL SURFACES, MOMENTS, AERODYNAMIC CONFIGURATIONS, TABLES (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE VOLUME PRESENTS THE RESULTS OF HIGH SPEED WIND TUNNEL TEST OF A ONE-EIGHTH SCALE MODEL OF THE U.S. ARMY XV-5A LIFT FAN RESEARCH AIRCRAFT. THE TESTS WERE CONDUCTED AT THE DAVID TAYLOR MODEL BASIN 7 X 10 FOOT TRANSONIC WIND TUNNEL FACILITY. CONVENTIONAL MODEL FORCE, PRESSURE, AND HINGE MOMENT DATA WERE OBTAINED OVER A MACH NUMBER RANGE OF .40 TO .90 AND PITCH AND SIDESLIP RANGES OF -4 TO 15 DEGREES AND -5 TO +5 DEGREES RESPECTIVELY. THE COMPLETE AIRCRAFT WAS THE PRIMARY CONFIGURATION TESTED, WITH THE MAJORITY OF THE VARIATIONS BEING IN CONTROL SURFACE AND STABILIZER SETTINGS. TESTS WERE ALSO CONDUCTED WITH THE VERTICAL AND HORIZONTAL TAIL SURFACES REMOVED, WITH WING FAN UPPER AND LOWER SURFACE STRUT FAIRINGS REMOVED, AND WITH ENGINE DUCT PRESSURE SURVEY RAKE INSTALLED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-654 041 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

CALCULATED WEIGHT, BALANCE AND MOMENTS OF INERTIA. (U)

JAN 64 139P
REPT. NO. 139
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIGHT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, DESIGN), (*RESEARCH PLANES, DESIGN), WEIGHT, STABILITY, MOMENT OF INERTIA, LIFT, PROPULSION, FANS, TABLES (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE REPORT CONTAINS WEIGHT AND BALANCE AND AIRCRAFT MOMENT OF INERTIA DATA IN SUMMARY AND IN DETAIL. THE SUMMARY DATA IS GIVEN FOR SEVERAL FUEL, FLIGHT TEST INSTRUMENTATION COMBINATIONS CONSIDERED COMPATIBLE WITH THE FLIGHT TEST PROGRAM. PERFORMANCE REQUIREMENTS WERE WRITTEN FOR ENDURANCE MISSIONS OF 20 AND 45 MINUTES AND THEREFORE WEIGHTS DATA ARE GIVEN FOR THE AIRCRAFT WITH FUEL TO PERFORM THESE MISSIONS WITH FLIGHT TEST INSTRUMENTATION INCLUDED. THE DESIGN GROSS WEIGHT OF THE AIRCRAFT IS 9200 LBS., AND THEREFORE DATA IS GIVEN FOR THIS WEIGHT. APPROXIMATELY 85 PERCENT OF THE AIRCRAFT WEIGHT WAS OBTAINED FROM MEASUREMENT OF COMPONENT AND SUB-ASSEMBLY WEIGHTS. IN ADDITION, THE AIRCRAFT ITSELF WAS WEIGHED AND THIS ACTUAL WEIGHT HAS BEEN USED TO DERIVE VARIOUS GROSS WEIGHT LOADING CONDITIONS. THE WEIGHT EMPTY GIVEN INCLUDES ONLY THOSE ITEMS REQUIRED BY THE AIRCRAFT SPECIFICATION. IT DOES NOT, FOR INSTANCE, INCLUDE THE AUXILIARY FUEL TANK NOR INSTRUMENTATION OR OTHER TEMPORARY ITEMS INSTALLED FOR INITIAL FLIGHT TEST PURPOSES. HORIZONTAL DISTANCES USED WERE MEASURED FROM FUSELAGE STATION ZERO. VERTICAL DISTANCES ARE MEASURED FROM A THEORETICAL PLANE 100 INCHES BELOW THE FUSELAGE HORIZONTAL REFERENCE PLANE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-654 042 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

STRESS ANALYSIS MAIN LANDING GEAR. (U)

JAN 64 231P
REPT. NO. 142
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIGHT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, LANDING GEAR), (*RESEARCH PLANES, LANDING GEAR), (*LANDING GEAR, STRESSES), STRUCTURAL PROPERTIES, MATHEMATICAL ANALYSIS, LOADING(MECHANICS), LIFT, FANS, PROPULSION (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE REPORT CONSISTS OF DATA SUBSTANTIATING THE STRUCTURAL INTEGRITY OF THE MAIN LANDING GEAR SHOCK STRUT. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-654 043 1/1 1/3 14/2
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED TECHNOLOGY AND DEMONSTRATOR PROGRAMS DEPT

FULL SCALE WIND TUNNEL TEST REPORT. (U)

JUN 66 303P
REPT. NO. 153
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FLIGHT TESTING), (*RESEARCH PLANES, FLIGHT TESTING), WIND TUNNELS, HOVERING, AERODYNAMIC CHARACTERISTICS, THERMODYNAMICS, PERFORMANCE(ENGINEERING), LIFT, PROPULSION, FANS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE TEST PROGRAM INCLUDED AERODYNAMIC, THERMODYNAMIC AND MECHANICAL EVALUATION OF THE COMPLETE FLIGHT TYPE AIRCRAFT SYSTEM AT FLIGHT SPEEDS EQUIVALENT TO HOVER UP THROUGH 100 KNOTS IN BOTH THE CONVENTIONAL AND FAN POWER MODES OF FLIGHT. THE REPORT SUMMARIZES THE MORE IMPORTANT AERODYNAMIC PERFORMANCE OBTAINED DURING THE TEST PROGRAM. THE DATA ARE PRESENTED GRAPHICALLY IN COEFFICIENT FORM TO PROVIDE A CONSISTENT BASIS OF COMPARISON. THE AERODYNAMIC RESULTS OBTAINED DURING THESE TESTS MAY BE SUMMARIZED BY SAYING THAT THE AIRCRAFT, AS DESIGNED AND TESTED, HAS ADEQUATE CONTROL POWER, LIFT, HORIZONTAL THRUST AND STATIC STABILITY TO PERMIT SAFE TRANSITIONAL FLIGHT BETWEEN A HOVER LIFT-OFF AND CONVERSION TO THE JET MODE OF FLIGHT. THE RESULTS OF THIS WIND TUNNEL TEST PROGRAM HAVE PROVEN TO BE A VALUABLE ASSET DURING CONDUCT OF THE FLIGHT TEST PROGRAM. USING THESE DATA, PREDICTIONS OF AIRCRAFT PERFORMANCE HAVE BEEN VERIFIED BY ACTUAL MEASURED FLIGHT DATA. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-654 783 1/1 1/3
LOCKHEED-GEORGIA CO MARIETTA

FULL SCALE TESTS OF THE XV-4A HUMMINGBIRD IN THE AMES 40 X 80 FOOT WIND TUNNEL. (U)

JAN 66 324P
REPT. NO. ER-7634
CONTRACT: DA-44-177-TC-713

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FLIGHT TESTING), HOVERING, TESTS, WIND TUNNELS, AERODYNAMIC CHARACTERISTICS, PITCH(MOTION), YAW, ANGLE OF ATTACK (U)
IDENTIFIERS: V-4 AIRCRAFT (U)

THE TESTS CONSISTED OF 41 RUNS AND A TOTAL OF 944 TEST POINTS. TESTS WERE CONDUCTED OVER A RANGE OF SPEEDS IN ALL PHASES OF FLIGHT FROM HOVER THROUGH TRANSITION TO CONVENTIONAL FLIGHT. PITCH AND YAW RUNS, AS WELL AS CONTROL EFFECTIVENESS RUNS IN ALL THREE MODES WERE MADE. MANY OF THE PITCH RUNS WERE MADE WELL INTO THE SO-CALLED DEEP STALL ANGLE OF ATTACK RANGE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-655 072 1/3 5/5
AIR FORCE FLIGHT DYNAMICS LAB WRIGHT-PATTERSON AFB OHIO

EXTERNAL VISIBILITY CRITERIA FOR VTOL AIRCRAFT. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 JUL 65-1 JUL 66,
MAR 67 65P ROBERTS,EDWARD O. ;
REPT. NO. AFFDL-TR-67-27
PROJ: AF-1425
TASK: 142501

UNCLASSIFIED REPORT
DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF AIR FORCE FLIGHT DYNAMICS LABORATORY, ATTN: FDFR, W-P AFB, OHIO.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, HUMAN ENGINEERING), (*VISIBILITY, VERTICAL TAKE-OFF PLANES), PILOTS, SPECIFICATIONS, COCKPITS, LANDINGS, DESIGN (U)
IDENTIFIERS: V-4 AIRCRAFT, V-5 AIRCRAFT, X-22 AIRCRAFT, C-142 AIRCRAFT (U)

THE REPORT CONTAINS A DISCUSSION OF SOME INFLUENCING FACTORS WHICH AFFECT THE PHYSICAL ABILITY OF THE PILOT TO SEE EXTERNALLY FROM THE AIRCRAFT ALONG WITH THE RESTRICTIONS THEY PRESENT TO THE FIELD OF VIEW. VISIBILITY DATA ARE PRESENTED ON FOUR EXPERIMENTAL VTOL AIRCRAFT, XV-4A, XV-5A, X-22, AND XC-142A, IN THE FORM OF BINOCULAR PHOTOGRAPHS. A CRITERIA TOOL IS PROVIDED BY ESTABLISHING THE DEPRESSION ANGLE OF THE SPHERICAL COORDINATE SYSTEM AS A PARAMETER TO DETERMINE THE VISIBILITY REQUIREMENTS FOR THE TERMINAL LANDING PHASE OF A VTOL AIRCRAFT. FINALLY, AN ABBREVIATED SET OF TABLES IS PRESENTED TO TRANSFER THE 'DEGREES-TO-THE-SIDE AND DEGREES-DOWN' COORDINATE ANGLES TO THE ANGLES OF THE SPHERICAL COORDINATE SYSTEM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-657 321 1/1 1/3
AIR FORCE FLIGHT DYNAMICS LAB WRIGHT-PATTERSON AFB OHIO

EFFECTS OF GUST VELOCITY SPATIAL DISTRIBUTIONS ON LATERAL-DIRECTIONAL RESPONSE OF A VTOL AIRCRAFT. (U)

DESCRIPTIVE NOTE: FINAL REPT. OCT 65-FEB 67,
JUN 67 37P SWAIM,ROBERT L. ;CONNORS, ALONZO J. ;
REPT. NO. AFFDL-TR-67-93
PROJ: AF-8219
TASK: 821903

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *GUST LOADS), (*ROLL, HOVERING), VELOCITY, MOMENTS, YAW, TURBULENCE, FLIGHT CONTROL SYSTEMS, EQUATIONS OF MOTION, FUSELAGES (U)

THE EFFECTS OF SPANWISE DISTRIBUTION OF LONGITUDINAL AND VERTICAL COMPONENTS OF GUST VELOCITY AND LONGITUDINAL DISTRIBUTION OF THE LATERAL COMPONENT ON THE LATERAL-DIRECTIONAL RESPONSE OF A HOVERING VTOL AIRCRAFT ARE ANALYZED. RESULTS SHOW THAT SPANWISE EFFECTS OF THE LONGITUDINAL AND VERTICAL COMPONENTS ARE NEGLIGIBLE, AND THE LONGITUDINAL DISTRIBUTION OF THE LATERAL COMPONENT IS SIGNIFICANT IN COMPUTING THE POWER SPECTRAL DENSITIES OF GUST-INDUCED SIDE FORCE, YAWING MOMENT, ROLLING MOMENT, AND THE AIRCRAFT SIDESLIP, YAW, AND ROLL ROOT-MEAN-SQUARE RESPONSE ANGLES. IF THE GUST-INDUCED ANGLES OF ATTACK AND SIDESLIP ANGLES ARE IN THE NONLINEAR RANGE OF LIFT CURVE SLOPE, THE ABOVE CONCLUSIONS, WHICH ARE BASED ON LINEAR AERODYNAMIC THEORY, MAY NOT HOLD AND AN ANALYSIS BASED ON MOMENTUM TRANSFER OF GUST ENERGY TO THE AIRCRAFT IS RECOMMENDED. FLOW FIELD INTERACTION EFFECTS DUE TO ENGINE INTAKE AND EXHAUST ALSO WERE NOT CONSIDERED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07/

AD-657 989 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

STRUCTURAL TEST RESULTS. (U)

MAR 64 365P
REPT. NO. 145
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, AIRFRAMES), (*RESEARCH PLANES, AIRFRAMES), (*AIRFRAMES, TESTS), FUSELAGES, SUPPORTS, LOADING(MECHANICS), LIFT, FANS, STRUCTURAL PROPERTIES (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE DETAILED STATIC TEST PROCEDURES DESCRIBED COVER THE 23 PROOF TESTS AND THE ONE ULTIMATE TEST TO BE ACCOMPLISHED ON THE XV-5A AIRCRAFT. THE PROCEDURES INCLUDE AIRPLANE SUPPORT SYSTEMS, LOADING ARRANGEMENTS AND METHODS OF LOAD APPLICATION, ALONG WITH DETAILED LOAD REACTING STRUCTURES AND LOAD CYLINDER ARRANGEMENTS. TABLES ARE PRESENTED BY WHICH LOAD CYLINDERS MAY BE CALIBRATED PRIOR TO EACH TEST. INSTRUMENTATION DETAILS ARE PROVIDED SHOWING LOCATION OF BOTH STRAIN AND DEFLECTION MEASURING EQUIPMENT AND TIMES DURING WHICH SPECIFIC MEASUREMENTS ARE TO BE MADE. DATA RECORDING DEVICES ARE ALSO INDICATED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-657 990 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

FINAL DESIGN WEIGHT REPORT. (U)

JUN 65 139P
REPT. NO. 159
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, DESIGN), (*RESEARCH PLANES, DESIGN), WEIGHT, MOMENT OF INERTIA, FUSELAGES, PROPULSION, LIFT, FANS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE REPORT CONTAINS WEIGHT AND BALANCE DATA IN SUMMARY AND IN DETAIL. THE SUMMARY DATA ARE GIVEN FOR SEVERAL FUEL AND FLIGHT TEST INSTRUMENTATION COMBINATIONS CONSIDERED COMPATIBLE WITH THE FLIGHT TEST PROGRAM. PERFORMANCE REQUIREMENTS WERE WRITTEN FOR ENDURANCE MISSIONS OF 20 TO 45 MINUTES AND THEREFORE WEIGHTS DATA ARE GIVEN FOR THE AIRCRAFT WITH FUEL TO PERFORM THESE MISSIONS WITH FLIGHT TEST INSTRUMENTATION INCLUDED. THE DESIGN GROSS WEIGHT OF THE AIRCRAFT IS 9200 LBS., AND THEREFORE DATA ARE GIVEN FOR THIS WEIGHT. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /20M07

AD-657 991 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

INSTALLED SYSTEMS FUNCTIONAL TEST PROCEDURE. (U)

NOV 63 86P
REPT. NO. 136
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, AIRCRAFT EQUIPMENT), (*RESEARCH PLANES, AIRCRAFT EQUIPMENT), (*AIRCRAFT EQUIPMENT, TESTS), PERFORMANCE(ENGINEERING), LIFT, FANS, PROPULSION, CONTROL STICKS (U)
IDENTIFIERS: AIRCRAFT (U)

THE PURPOSE OF THESE TESTS IS TO DEMONSTRATE THAT THE XV-5A AIRCRAFT SYSTEMS FUNCTION IN ACCORDANCE WITH THE DESIGN REQUIREMENTS. THE TESTING PROCEDURE IS DIVIDED INTO 12 MAJOR TESTS. THE ORDER OF APPEARANCE IS THE DESIRED CHRONOLOGICAL ORDER. WHEN THE AIRCRAFT IS RECEIVED FOR FUNCTIONAL TESTS, THE HYDRAULIC AND PNEUMATIC SYSTEMS WILL HAVE BEEN FLUSHED, FILLED AND BLED IN ACCORDANCE WITH RYAN REPORT 14359-6. THE CONTROLS WILL HAVE BEEN RIGGED IN ACCORDANCE WITH RYAN REPORT 14395-5. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-657 992 1/3 21/5
GENERAL ELECTRIC CO CINCINNATI OHIO FLIGHT PROPULSION LAB DEPT

X353-5B PROPULSION SYSTEM FLIGHTWORTHINESS TEST REPORT. VOLUME I. (U)

JAN 63 196P
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON VZ-11 LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO AD-634 950.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *PROPULSION), (*RESEARCH PLANES, PROPULSION), FLIGHT TESTING, TESTS, RELIABILITY, FANS, TURBOJET ENGINES, LIFT (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

AN X353-5B PROPULSION SYSTEM COMPRISED OF TWO J85-GE-5 TURBOJET ENGINES WITHOUT AFTERBURNERS, TWO X353-5B DIVERTER VALVES, ONE X353-5 LIFT FAN AND ONE X370 PITCH TRIM CONTROL FAN WAS ASSEMBLED AND TESTED. THE SPECIFIED TESTING WAS COMPLETED. THE J85 GAS GENERATORS WERE UNAFFECTED BY THE PRESENCE OF THE X353-5B PROPULSION SYSTEM. THE DIVERTER VALVES AND THE PITCH FAN MET OR EXCEEDED PERFORMANCE REQUIREMENTS AT ALL OPERATING CONDITIONS. THE LIFT FAN MET OR EXCEEDED PERFORMANCE REQUIREMENTS AT ALL BUT ONE CONDITION (SINGLE ENGINE LIFT). THERE WERE ONLY MINOR DISCREPANCIES FOUND IN THE DIVERTER VALVE AND PITCH FAN HARDWARE AT DISASSEMBLY. THE LIFT FAN HAD CONSIDERABLE DAMAGE RESULTING FROM THE SHEDDING OF A SMALL METAL TAB FROM THE ROTOR DURING THE LAST ENDURANCE CYCLE OF THE TEST. LIFT FAN ALUMINUM INLET VANES AND EXIT LOUVERS WERE OF GENERALLY POOR MANUFACTURING QUALITY AND DID NOT SATISFACTORILY COMPLETE THE TEST. IT WAS RECOMMENDED THAT A FLIGHTWORTHINESS RATING BE ASSIGNED TO THE X353-5B PROPULSION SYSTEM UPON SATISFACTORY COMPLETION OF A 10-HOUR PENALTY TEST OF NEW LIFT FAN INLET VANES AND EXIST LOUVERS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-657 993 1/3 1/1
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

FLIGHTWORTHINESS AND RELIABILITY SUMMARY REPORT. (U)

AUG 65 186P
REPT. NO. 162
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FLIGHT TESTING), (*RESEARCH PLANES, FLIGHT TESTING), RELIABILITY, SAFETY, LIFT, FANS, PERFORMANCE(ENGINEERING), STANDARDS, PROPULSION (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE DATA INDICATE THAT THE XV-5A AIRCRAFT IS SAFE AND AIRWORTHY. THIS CONCLUSION WAS SUBSTANTIATED BY ANALYSIS, GROUND TEST AND FLIGHT TEST. THE XV-5A IS SHOWN TO BE STRUCTURALLY SOUND AND SUITABLE FOR USE IN A FLIGHT TEST PROGRAM OF AT LEAST 250 HOURS. THE AIRPLANE WAS MANUFACTURED TO EXACTING AIRCRAFT STANDARDS IN CHOICE AND USE OF MATERIALS, COMPONENTS AND SUBSYSTEMS, AND WAS MANUFACTURED AND TESTED WITH STRICT QUALITY CONTROL STANDARDS MAINTAINED. SAFETY AND AIRWORTHINESS OF THE XV-5A VTOL AIRCRAFT, USING THE LIFT FAN CONCEPT, WAS DEMONSTRATED. FLIGHT TESTS INDICATE THAT CONTROLLABILITY IS ADEQUATE AND IN AGREEMENT WITH ACCEPTABLE STANDARDS. CONTROL IS SATISFACTORY IN VTOL AND CTOL THROUGHOUT THE FLIGHT ENVELOPE; AND DURING GROUND ROLL AND TAXI. FLUTTER ANALYSIS, AND EXPERIMENTAL GROUND, WIND TUNNEL AND FLIGHT TESTS INDICATE THAT THE AIRCRAFT IS FREE OF FLUTTER WITHIN THE PRESCRIBED FLIGHT ENVELOPE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-657 994 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

CALCULATED HEAT TRANSFER AND COOLING SYSTEM PERFORMANCE, VOLUME II. (U)

JUN 65 339P
REPT. NO. 160-VOL-2
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT
AVAILABILITY: MICROFICHE ONLY AFTER ORIGINAL COPIES EXHAUSTED.
SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO VOLUME 1, AD-657 995.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, COOLING + VENTILATING EQUIPMENT), (*RESEARCH PLANES, COOLING + VENTILATING EQUIPMENT), (*COOLING + VENTILATING EQUIPMENT, PERFORMANCE(ENGINEERING)), COOLING, HEAT TRANSFER, AIRFRAMES, THERMAL INSULATION, THERMAL ANALYSIS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

VOLUME II CONTAINS SUPPORTING DATA INCLUDING TEST RESULTS PROVIDING THE BASIS FOR ESTIMATES OF EXTERNAL AIRFRAME HEATING, METHODS USED IN CALCULATION OF COOLING SYSTEM PERFORMANCE AND AN ANALYSIS OF STRUCTURAL PROTECTION SYSTEMS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-657 995 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

CALCULATED HEAT TRANSFER AND COOLING SYSTEM PERFORMANCE, VOLUME I. (U)

JUN 65 303P
REPT. NO. 160-VOL-1
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT
AVAILABILITY: AVAILABLE IN MICROFICHE ONLY.
SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO VOLUME 2, AD-657 994.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, COOLING + VENTILATING EQUIPMENT), (*RESEARCH PLANES, COOLING + VENTILATING EQUIPMENT), (*COOLING + VENTILATING EQUIPMENT, PERFORMANCE(ENGINEERING)), COOLING, HEAT TRANSFER, TURBOJET ENGINES, DOWNWASH, THERMAL INSULATION, FUSELAGES (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

BASED ON ANALYSIS AND LIMITED TEST DATA, THE AIRCRAFT COOLING AND STRUCTURAL PROTECTION SYSTEMS ARE BELIEVED TO HAVE SUFFICIENT PERFORMANCE CAPABILITY TO PERMIT ORDERLY CONDUCT OF INSTALLED SYSTEM FUNCTIONAL, NASA-AMES 40' X 80' WIND TUNNEL, AND EDWARDS AIR FORCE BASE FLIGHT TEST PROGRAMS EVEN THOUGH EXTERNALLY INDUCED ENVIRONMENTAL TEMPERATURES TO 1040F DEVELOP DURING FAN MODE OPERATION. OCCASIONAL LOCAL AND MINOR OVERHEATING PROBLEMS ARE EXPECTED WITHIN THE BROAD RANGE OF POSSIBLE OPERATING CONDITIONS; HOWEVER, IT IS EXPECTED THEY CAN BE OVERCOME WITH MINOR STRUCTURAL MODIFICATIONS, INSTALLATION OF ADDITIONAL INSULATION, AND/OR MINOR MODIFICATION OF OPERATIONAL PROCEDURES. LACK OF DETAILED KNOWLEDGE OF THE EXTERNALLY INDUCED ENVIRONMENT MADE COOLING AND STRUCTURAL SYSTEMS DESIGNS AND ANALYSIS DIFFICULT. IN AN ATTEMPT TO GAIN FURTHER INSIGHT TO THIS COMPLEX PROBLEM, A PROCEDURE WAS DEVELOPED WHEREBY EXISTING LITERATURE DATA ON DOWNWASH PHENOMENA COULD BE APPLIED QUANTITATIVELY TO THE XV-5A INDUCED ENVIRONMENT. RESULTS SHOW DIRECTIONAL EFFECTS OF AIRCRAFT CONTROL SETTINGS, AND INDICATE THE STRONG POSSIBILITY OF HOT GAS INGESTION BY THE ENGINE AND COOLING SYSTEM AIR INLET. THESE RESULTS ALSO INDICATE MEANS WHEREBY ADVERSE EFFECTS MAY BE MINIMIZED OR ELIMINATED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-657 996 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

INSTALLED SYSTEMS FUNCTIONAL TESTS REPORT. (U)

SEP 64 312P
REPT. NO. 149
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT
AVAILABILITY: AVAILABLE IN MICROFICHE ONLY.
SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, TESTS), (*RESEARCH PLANES, TESTS), AIRCRAFT EQUIPMENT, FLIGHT CONTROL SYSTEMS, COCKPITS, TURBOJET ENGINES, FANS, LIFT, LANDING GEAR, FIRE EXTINGUISHERS, PERFORMANCE(ENGINEERING) (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

THE INSTALLED SYSTEMS TESTS DEMONSTRATE THAT THE AIRCRAFT SYSTEMS FUNCTION IN ACCORDANCE WITH DESIGN REQUIREMENTS. TESTS WERE DIVIDED INTO THIRTEEN MAJOR FUNCTIONAL AREAS AS FOLLOWS: ELECTRICAL SYSTEM CHECKOUT; SURFACE GAINS AND HYSTERESIS; FLIGHT CONTROLS STABILITY; FLIGHT MODE CONVERSION SEQUENCE; COCKPIT CHECKOUT; ENGINE RUN TEMPERATURE SURVEY; ENGINE RUN ELECTRICAL SYSTEM CHECKOUT; AUTO-STABILITY TESTS; FAN FLIGHT TRIM RATES; LANDING GEAR TESTS; CONTROLS PROOF LOADS; WEIGHT-BALANCE AND FUEL TESTS; FIRE EXTINGUISHER SYSTEM TESTS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-657 997 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO ADVANCED ENGINE AND TECHNOLOGY DEPT

FUSELAGE STRUCTURAL ANALYSIS. VOLUME III. FRAMES, BULKHEADS AND FITTINGS. (U)

FEB 64 98P
REPT. NO. 144-VOL-3
CONTRACT: DA-44-177-TC-715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON XV-5A LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM. SEE ALSO VOLUME 2, AD-653 564 AND VOLUME 4, AD-640 338.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FUSELAGES), (*RESEARCH PLANES, FUSELAGES), (*FUSELAGES, STRUCTURAL PROPERTIES), LOADING(MECHANICS), AIRFRAMES, FITTINGS, MATHEMATICAL ANALYSIS, SUPPORTS (U)
IDENTIFIERS: V-5 AIRCRAFT (U)

A SUMMARY TYPE LOAD ANALYSIS IS PRESENTED FOR EACH COMPONENT, WITH THE PRIMARY INTENT OF SHOWING THE STRUCTURAL CONFIGURATION, FINAL CRITICAL LOADING AND UNUSUAL ASSUMPTIONS MADE. STRUCTURAL ADEQUACY OF MANY OF THE PRIMARY COMPONENTS WAS DEMONSTRATED BY PROOF TESTS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-661 087 1/3 1/2
CORNELL AERONAUTICAL LAB INC BUFFALO N Y

PERFORMANCE AND STRESSES OBTAINED ON AN ISOLATED VTOL-TYPE PROPELLER OPERATING IN HOVERING, TRANSITIONAL, AND AXIAL FLIGHT. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. JUN 65-JAN 67,
AUG 67 97P TRENKA,ANDREW R. ;
REPT. NO. CAL-BB-1840-S-2
CONTRACT: DA-44-177-AMC-75(T)
TASK: 1F125901A142
MONITOR: USAAVLABS TR-67-37

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, PROPELLERS(AERIAL)), (*PROPELLERS(AERIAL), PERFORMANCE(ENGINEERING)), STRESSES, FLIGHT, HOVERING, TEST EQUIPMENT, CALIBRATION, AERODYNAMIC LOADING (U)

EXPERIMENTAL PERFORMANCE AND BLADE STRESSES MEASURED ON A THREE-BLADED VTOL-TYPE PROPELLER TESTED IN FREE AIR ARE PRESENTED. THE ISOLATED PROPELLER WAS TESTED OVER RANGES OF PROP SPEED, FORWARD VELOCITY, BLADE ANGLE SETTING, AND THRUST AXIS TO FREE-STREAM ANGLE. CORRELATION WITH A THEORETICAL METHOD OF PREDICTING PROPELLER PERFORMANCE AND BLADE STRESSES WAS MADE. IT WAS FOUND THAT WHEN THE PROPELLER WAS OPERATING IN A FLIGHT CONDITION FOR WHICH THE THEORY WAS DEVELOPED, CORRELATION BETWEEN THEORY AND EXPERIMENT WAS GOOD. WHEN THE PROPELLER WAS OPERATING IN A FLIGHT CONDITION WHERE VERY SMALL POSITIVE OR NEGATIVE EFFECTIVE ANGLES OF ATTACK WERE ENCOUNTERED, CORRELATION BETWEEN THEORY AND EXPERIMENT WAS POOR. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-661 253 1/2 5/10
THERM ADVANCED RESEARCH INC ITHACA N Y

EXPERIMENTAL STUDY OF PILOT VISIBILITY FROM A VTOL AIR/SEA CRAFT NEAR THE OCEAN SURFACE. (U)

DESCRIPTIVE NOTE: INTERIM REPT, 22 JUN 66-21 JUN 67
JUL 67 39P TAN,P. M. ;HALE,R. W. ;
ORDWAY,D. E. ;
REPT. NO. TAR-TR-6704
CONTRACT: N00014-66-C-0320

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, DOWNWASH), (*PILOTS, *VISIBILITY), OCEANS, SPRAYS, SURFACES, FLIGHT (U)

A MAJOR PROBLEM ASSOCIATED WITH THE OPERATION OF A VTOL AIR/SEA CRAFT NEAR THE OCEAN SURFACE IS THE IMPAIRMENT OF PILOT VISIBILITY. CLOUDS OF SPRAY, GENERATED BY DOWNWASH IMPINGEMENT ON THE WATER SURFACE, SURROUND THE AIRCRAFT AND BLOCK THE PILOT'S VIEW. THE OBJECTIVE OF THE STUDY WAS TO DETERMINE PROMISING METHODS FOR ALLEVIATING THE PROBLEM. A MODEL-SCALE EXPERIMENTAL FACILITY WAS CONSTRUCTED TO STUDY THE DETAILS OF SPRAY GENERATION AND THE CHARACTERISTICS OF THE RESULTING SPRAY PATTERN. SEVERAL SPRAY ALLEVIATION DEVICES WERE THEN DESIGNED AND TESTED. TO EVALUATE THEIR EFFECTIVENESS, A TECHNIQUE FOR QUANTITATIVE MEASUREMENT OF VISIBILITY WAS DEVELOPED. COMPARATIVE TESTS WERE CONDUCTED WITH AND WITHOUT THE SPRAY ALLEVIATION DEVICES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-661 592 1/2 8/6 8/13
CORNELL AERONAUTICAL LAB INC BUFFALO N Y

QUANTITATIVE TERRAIN STUDY OF VTOL LANDING SITE DISTRIBUTIONS AND OF EFFECTS ON PENETRATION. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUL 66-30 JUN 67,
JUN 67 125P WOOD,W. F. ;THUNG,H. L.
;LEWANDOWSKI,G. M. ;
REPT. NO. CAL-VE-2303-D
CONTRACT: AF 33(615)-3483
MONITOR: ASD TR-67-18

UNCLASSIFIED REPORT

DESCRIPTORS: (•AIRCRAFT LANDINGS, •TERRAIN), (•VERTICAL TAKE-OFF PLANES, AIRCRAFT LANDINGS), DISTRIBUTION, LANDING FIELDS, SITE SELECTION, PROBABILITY, MAPS, SOIL MECHANICS, AERIAL PHOTOGRAPHY, ALASKA, THAILAND, INDIA, NEVADA, ITALY, EAST GERMANY, WEST GERMANY, TRAFFICABILITY, PENETRATION (U)

A VTOL SITE IS ASSUMED TO REQUIRE A GROUND SLOPE OF 10% OR LESS AND BE CLEAR OF TREES. ALSO THERE CAN BE NO BOULDERS OVER 2 FEET HIGH OR GULLIES DEEPER THAN 2 FEET. SINGLE SITES, IF SQUARE, SHOULD BE 200 FEET ON A SIDE AND IF CIRCULAR 250 FEET IN DIAMETER. ASSAULT SITES, IF SQUARE, SHOULD BE 1500 FEET ON A SIDE AND 2000 FEET IN DIAMETER, IF CIRCULAR. PROBABILITY DISTRIBUTIONS OF DISTANCES TO SINGLE AND ASSAULT SITES, BASED ON A STUDY OF ENVIRONMENTAL LITERATURE, TOPOGRAPHIC MAPS AND AERIAL PHOTOGRAPHS ARE PRESENTED FOR THAILAND, INDIA, NEVADA, ITALY, GERMANY AND ALASKA. A VTOL SITE MAY BE EXPECTED WITHIN A FEW MILES IN ALL BUT THE MOST UNFAVORABLE ENVIRONMENTS. SITES LOCATED ON RESIDUAL SOILS WOULD SELDOM BE TOO SOFT FOR VTOL OPERATIONS, BUT ALLUVIAL SOILS SHOULD BE AVOIDED WHEN POORLY DRAINED. PRIOR KNOWLEDGE OF ANALOGOUS SITUATIONS, AERIAL PHOTOGRAPHY AND DIRECT OBSERVATION PROVIDE THE BEST INFORMATION FOR EVALUATING CANDIDATE SITES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-662 715 1/3 14/4
ARMY AVIATION MATERIEL LABS FORT EUSTIS VA

XV-5A MAINTENANCE AND SYSTEMS EVALUATION. (U)

DESCRIPTIVE NOTE: REPT. FOR 27 JAN-15 NOV 65,
JUL 67 216P MASSIE,ROBERT K. ;
REPT. NO. USAAVLABS-TR-67-53
TASK: AA-65-21

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, DESIGN),
(*RESEARCH PLANES, MAINTAINABILITY),
RELIABILITY, PERFORMANCE(ENGINEERING),
PROPULSION, FANS, EFFECTIVENESS, HEATING,
AIRCRAFT EQUIPMENT (U)
IDENTIFIERS: V-5 AIRCRAFT, EVALUATION (U)

THE DATA COMPILED DURING THIS EVALUATION WERE USED TO DETERMINE THE EFFECTIVENESS OF DESIGN AS IT APPLIES TO MAINTAINABILITY OF THE OVERALL AIRCRAFT, ITS SYSTEMS, AND ITS SUBSYSTEMS AND, IN CASES OF DEFICIENCIES, TO RECOMMEND IMPROVEMENTS AND TO SPECIFY AREAS THAT REQUIRE FURTHER RESEARCH BEFORE DERIVATIVE XV-5A-TYPE AIRCRAFT ARE CONSTRUCTED. EACH PROBLEM AREA WAS ANALYZED TO DETERMINE WHETHER THE DISCREPANCIES RESULTED FROM THE AUSTERE RESEARCH AIRCRAFT PROGRAM OR WHETHER THEY WERE INHERENT IN THE LIFT-FAN CONCEPT. RESULTS OF THIS STUDY UNCOVERED THE DESIRABLE AND UNDESIRABLE FEATURES OF 10 OF THE XV-5A AIRCRAFT SYSTEMS. DESIGN REFINEMENTS THAT WILL BE REQUIRED TO BUILD THE LIFT-FAN CONCEPT INTO AN OPERATIONAL MODEL ARE NOT BEYOND THE ENGINEERING TECHNOLOGY AVAILABLE DURING THE 1967-1971 TIME PERIOD. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-663 848 1/3 1/1
PRINCETON UNIV N J DEPT OF AEROSPACE AND MECHANICAL SCIENCES

AN EXPERIMENTAL INVESTIGATION OF THE LONGITUDINAL DYNAMIC STABILITY CHARACTERISTICS OF A FOUR-PROPELLER TILT-WING VTOL MODEL. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
SEP 67 124P CURTISS,H. C. , JR.;
PUTMAN,W. F. ;LEBACQZ,J. V. ;
REPT. NO. 774
CONTRACT: DA-44-177-AMC-8(T)
PROJ: DA-1P125901A142
TASK: 1P125901A14233
MONITOR: USAAVLABS TR-66-80

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, PITCH(MOTION)), AIRPLANE MODELS, SCALE, FLIGHT, TILT WINGS, AERODYNAMIC CHARACTERISTICS, PROPELLERS(AERIAL), TRANSPORT PLANES, ANGLE OF ATTACK, OSCILLATION, DAMPING (U)

THE RESULTS OF EXPERIMENTS CONDUCTED TO EVALUATE THE LONGITUDINAL STABILITY CHARACTERISTICS OF A 1/10 SCALE DYNAMIC MODEL OF A FOUR-PROPELLER TILT-WING VTOL TRANSPORT ARE PRESENTED AND DISCUSSED. THE PRINCETON DYNAMIC MODEL TRACK WAS USED TO MEASURE THE STATIC STABILITY AND THE TRANSIENT RESPONSE OF THE MODEL AT WING INCIDENCES FROM 90 DEGREES TO 40 DEGREES. THE RESULTS ARE INTERPRETED IN TERMS OF FULL-SCALE AIRCRAFT CHARACTERISTICS. ALL DATA ARE PRESENTED FOR A C.G. POSITION OF 90% MAC (THE MOST FORWARD C.G. POSITION OF THE AIRCRAFT IS 15% MAC) AND THE HORIZONTAL TAIL AND FLAP PROGRAM DIFFER FROM THOSE PRESENTLY USED ON THE AIRCRAFT. THE TRANSIENT MOTIONS AT WING INCIDENCES ABOVE 70 DEGREES WERE SIMILAR AND DOMINATED BY HIGH SPEED STABILITY AND LOW ANGULAR DAMPING RESULTING IN AN UNSTABLE OSCILLATION OF APPROXIMATELY A 9-SECOND PERIOD FOR THE FULL-SCALE AIRCRAFT. THE RESPONSES AT WING INCIDENCES BELOW 70 DEGREES WERE MORE COMPLEX DUE TO A RAPID DECREASE IN THE SPEED STABILITY FROM A LARGE POSITIVE VALUE ABOVE 70 DEGREES TO A NEGATIVE VALUE AT 60 DEGREES.

(U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-666 247 1/3 20/4 1/1
DYNASCIENCES CORP BLUE BELL PA

INVESTIGATION OF PROPELLER SLIPSTREAM EFFECTS ON WING PERFORMANCE. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
NOV 67 213P GEORGE,M. ;KISIELOWSKI,E. ;
REPT. NO. DCR-234
CONTRACT: DA 44-177-AMC-394(T)
PROJ: DA-1F125901A142
TASK: 1F125901A14231
MONITOR: USAAVLABS TR-67-67

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, AERODYNAMIC CHARACTERISTICS), (*PROPELLERS(AERIAL), INTERACTIONS), WIND TUNNEL MODELS, LIFT, DRAG, PITCH(MOTION), MOMENTS, INTERACTIONS, PERFORMANCE(ENGINEERING), ASPECT RATIO, TAPER, MODEL TESTS, TILT WINGS (U)
IDENTIFIERS: SLIPSTREAM (U)

A THEORETICAL AND EXPERIMENTAL STUDY WAS CONDUCTED TO DETERMINE THE EFFECTS OF PROPELLER SLIPSTREAM ON WING PERFORMANCE. PREVIOUSLY DEVELOPED THEORETICAL ANALYSES WERE EXPANDED AND MODIFIED TO ACCOUNT FOR RADIAL VARIATION OF THE PROPELLER SLIPSTREAM VELOCITY. THE EXPERIMENTAL PROGRAM CONSISTED OF WIND TUNNEL TESTS CONDUCTED WITH A MOTOR-PROPELLER SYSTEM MOUNTED ON A SEMISPAN WING MODEL. THE WING MODEL UTILIZED HAS A CHORD TO PROPELLER DIAMETER OF .46, AN ASPECT RATIO OF 6.37 (3.18 FOR SEMISPAN), A TAPER RATIO OF 1.0, AND A NACA 0015 AIRFOIL SECTION. THE WING MODEL HAS EIGHT FLOATING WING SEGMENTS WITH AND WITHOUT A 45-DEGREE SIMULATED SPLIT FLAP. LOCATED WITHIN EACH FLOATING WING SEGMENT IS A THREE-COMPONENT STRAIN GAGE BALANCE TO PROVIDE MEASUREMENTS OF LIFT, DRAG, AND PITCHING MOMENT. THE MEASUREMENTS OF TOTAL WING LIFT, DRAG, AND PITCHING MOMENT WERE OBTAINED WITH THE SIX-COMPONENT MAIN WIND TUNNEL BALANCE. THE TEST DATA OBTAINED INCLUDED THE EFFECTS OF THE VARIATION OF PROPELLER SLIPSTREAM VELOCITY BY UTILIZING TWO PROPELLERS OF DIFFERENT GEOMETRIES. PROPELLER ROTATION FOR ALL TESTS WAS DOWN AT THE WING TIP. THE EXPERIMENTAL AND THEORETICAL RESULTS ARE COMPARED; IN GENERAL, GOOD CORRELATION IS OBSERVED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-667 140 1/3 14/4
FEDERAL AVIATION AGENCY WASHINGTON D C FLIGHT STANDARDS SERVICE

FAA DEVELOPMENTS RELATIVE TO DESIGN OF NEW AIRCRAFT STRUCTURES. (U)

66 11P DOUGHERTY,JAMES E. ;

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED FOR PRESENTATION AT THE FAA MAINTENANCE SYMPOSIUM 'CONTINUED RELIABILITY OF TRANSPORT TYPE AIRCRAFT STRUCTURE', WASHINGTON, D. C., 2-4 NOV 66.

DESCRIPTORS: (*TRANSPORT PLANES, *SUPERSONIC PLANES), (*VERTICAL TAKE-OFF PLANES, DESIGN), COMMERCIAL PLANES, AIRFRAMES, AVIATION SAFETY, SHORT TAKE-OFF PLANES, RELIABILITY, MAINTENANCE, ROTARY WINGS, HELICOPTERS (U)
IDENTIFIERS: SUPERSONIC TRANSPORT PLANES, FEDERAL AVIATION REGULATIONS, CRASHWORTHINESS (U)

THE FOLLOWING BROAD AREAS ARE COVERED: (1) SUPERSONIC TRANSPORTS; (2) TRANSPORT DESIGNS UNDER FEDERAL AVIATION REGULATION 25; (3) GENERAL AVIATION DESIGNS UNDER FEDERAL AVIATION REGULATION 23; (4) ROTORCRAFT DESIGNS UNDER FEDERAL AVIATION REGULATIONS 27 AND 29; (5) V/STOL AIRCRAFT; (6) CRASHWORTHINESS AND PASSENGER EVACUATION. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-667 264 1/3 9/2
MELPAR INC FALLS CHURCH VA

SIMULATION OF HELICOPTER AND V/STOL AIRCRAFT, VOLUME VI, XC-142 ANALOG COMPUTER PROGRAM STUDY: XC-142A SIMULATION EQUATION MECHANIZATION. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JAN 65 213P MAKARCZYK,J. A. ;FAITH,R. L. ;
CONTRACT: N61339-1205
MONITOR: NAVTRADEVCEN 1205-6

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 5, AD-615 452.

DESCRIPTORS: (*TRANSPORT PLANES, MATHEMATICAL MODELS), (*VERTICAL TAKE-OFF PLANES, MATHEMATICAL MODELS), TILT WINGS, ANALOG COMPUTERS, SIMULATION, HELICOPTERS, SHORT TAKE-OFF PLANES, COMPUTER PROGRAMS, FLOW CHARTING, AIRFOILS, AERODYNAMIC CHARACTERISTICS, RESEARCH PLANES (U)
IDENTIFIERS: COMPUTER SIMULATION, C-142 AIRCRAFT, XC-142A AIRCRAFT (U)

THE REPORT PRESENTS THE ANALYSIS AND SIMPLIFICATION PROCEDURES THAT ARE REQUIRED TO DEFINE AND PROGRAM THE MATHEMATICAL MODEL FOR THE XC-142A AIRCRAFT IN A FORM WHICH IS SUITABLE FOR MECHANIZATION AND SOLUTION ON A GENERAL PURPOSE ANALOG COMPUTER. THIS PROGRAM WILL ENABLE THE NAVAL TRAINING DEVICE CENTER TO PERFORM DYNAMIC SIMULATION STUDIES FOR A V/STOL TILT-WING AIRCRAFT. SECTION II CONTAINS THE COMPLETE MATHEMATICAL MODEL OF THE XC-142 WITH ACCOMPANYING DENOTATION AND VALIDATION. IN SECTION III, THREE SETS OF SIMULATION EQUATIONS ARE PRESENTED. THESE SETS REPRESENT THE COMPLETE SIX DEGREES OF FREEDOM EQUATIONS, LONGITUDINAL MODE EQUATIONS, AND LATERAL-DIRECTIONAL MODE EQUATIONS. SECTION IV CONTAINS THE MECHANIZATION FUNCTIONAL BLOCK DIAGRAMS ALONG WITH THE PATCHING AND OPERATING INSTRUCTIONS REQUIRED FOR THEIR UTILIZATION. SECTION IV ALSO SPECIFIES THE ANALOG COMPUTER INSTALLATION WHICH IS REQUIRED TO SOLVE THE MECHANIZATIONS. THE SUBSEQUENT SECTIONS CONTAIN: A DISCUSSION OF PROGRAM LIMITATIONS, CONCLUSIONS, AND RECOMMENDATIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-667 936 1/3 1/4 13/7
HARRY DIAMOND LABS WASHINGTON D C

FLUIDIC STALL SENSING SYSTEM. (U)

FEB 68 4UP WARREN,RAYMOND W. ;SWARTZ, ELMER L. ;
REPT. NO. HDL-TR-1368
PROJ: DA-1P125901A142, HDL-42700
TASK: 1P125901A14233

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, STALL-WARNING INDICATORS), (*STALL-WARNING INDICATORS, *FLUID AMPLIFIERS), SHORT TAKE-OFF PLANES, FLOW SEPARATION, ANGLE OF ATTACK, WINGS, STALLING, LIFT, BOUNDARY LAYER, DISPLAY SYSTEMS, FLUIDICS, PROBES, SENSORS (U)
IDENTIFIERS: BLOWING, ATTACHED FLOW (U)

THE FLUID STALL SENSOR IS A REMOTE INDICATING SYSTEM FOR DETECTING STALL ON AIRCRAFT WINGS. WHEN THE FLOW IS ATTACHED TO THE WING, IT CAUSES ASPIRATION FROM A PROBE JUST ABOVE THE WING SURFACE. SEPARATED FLOW, ASSOCIATED WITH STALL, DECREASES THE ASPIRATION. THE CHANGE IN ASPIRATION IS AMPLIFIED BY A HIGH IMPEDANCE FLUID AMPLIFIER WHICH DRIVES AN INDICATOR. THE POSITION OF INDICATORS FROM SEVERAL PROBES ACROSS THE WING GIVES AN INDICATION OF THE AMOUNT OF LIFT REMAINING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-667 980 1/3 20/4 1/1
BOEING CO RENTON WASH COMMERCIAL AIRPLANE DIV

A GENERAL METHOD FOR DETERMINING THE AERODYNAMIC CHARACTERISTICS OF FAN-IN-WING CONFIGURATIONS. VOLUME I. THEORY AND APPLICATION. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
DEC 67 298P RUBBERT,P. E. ;SAARIS,G. R. ;SCHOLEY,M. B. ;STANDEN,N. M. ;WALLACE, R. E. ;
CONTRACT: DA-44-177-AMC-323(T)
TASK: 1F125901A14234
MONITOR: USAAVLABS TR-67-61A-VOL-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 2, AD-667 981.

DESCRIPTORS: (•VERTICAL TAKE-OFF PLANES, AERODYNAMIC CHARACTERISTICS), DUCTED FANS, WING INLETS, INCOMPRESSIBLE FLOW, LIFT, SHORT TAKE-OFF PLANES, AERODYNAMIC CONFIGURATIONS, POTENTIAL THEORY, THREE-DIMENSIONAL FLOW, BOUNDARY LAYER, JET MIXING FLOW, AXIALLY SYMMETRIC FLOW, FLOW FIELDS, BOUNDARY VALUE PROBLEMS, THRUST VECTOR CONTROL SYSTEMS, ANGLE OF ATTACK, YAW, FLIGHT, FLAPS, COMPUTER PROGRAMS (U)
IDENTIFIERS: FAN-IN-WING CONFIGURATIONS, •LIFT FANS, STREAMLINES (U)

A GENERAL METHOD IS PRESENTED FOR THE DETERMINATION OF AERODYNAMIC CHARACTERISTICS OF FAN-IN-WING CONFIGURATIONS BY MEANS OF INCOMPRESSIBLE POTENTIAL-FLOW THEORY. THE METHOD IS APPLICABLE TO WINGS, FLAPPED OR UNFLAPPED, AND TO A WIDE VARIETY OF OTHER POTENTIAL-FLOW BOUNDARY-VALUE PROBLEMS. ARBITRARY WING AND INLET GEOMETRY, FAN INFLOW DISTRIBUTION, THRUST VECTORING, ANGLE OF ATTACK, ANGLE OF YAW, AND FLIGHT SPEEDS FROM HOVER THROUGH TRANSITION CAN BE TREATED. THE THEORETICAL MODEL IS COMPLETELY THREE DIMENSIONAL, WITH NO LINEARIZATION OF BOUNDARY CONDITIONS. THE CALCULATED RESULTS INCLUDE PRESSURE DISTRIBUTIONS, LIFT, INDUCED DRAG AND SIDE FORCE, PITCHING MOMENT, ROLLING MOMENT AND YAWING MOMENT. THE NUMERICAL POTENTIAL-FLOW SOLUTION IS OBTAINED WITH SOURCE AND VORTEX DISTRIBUTIONS ON THE BOUNDARY SURFACES. THE REPRESENTATION IS COMPOSED OF SMALL, CONSTANT-STRENGTH SOURCE SHEET PANELS DISTRIBUTED OVER THE EXTERIOR WING SURFACES, INTERNAL VORTEX FILAMENTS WHICH EMANATE FROM THE WING TRAILING EDGE TO PROVIDE CIRCULATION; (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-667 981 1/3 20/4 9/2 1/1
BOEING CO RENTON WASH

GENERAL METHOD FOR DETERMINING THE AERODYNAMIC CHARACTERISTICS OF FAN-IN-WING CONFIGURATIONS. VOLUME II. COMPUTER PROGRAM DESCRIPTION. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
DEC 67 235P HINK,GARY R. ;GILBERT, RICHARD F. ;SUNDSTRUM,KNUT A. ;
CONTRACT: DA-44-177-AMC-323(T)
PROJ: DA-1F125901A142
TASK: 1F125901A14234
MONITOR: USAAVLABS TR-67-61B-VOL-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME I, AD-667 980.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, AERODYNAMIC CHARACTERISTICS), (*DUCTED FANS, COMPUTER PROGRAMS), WING INLETS, INCOMPRESSIBLE FLOW, LIFT, SHORT TAKE-OFF PLANES, AERODYNAMIC CONFIGURATIONS, POTENTIAL THEORY, THREE-DIMENSIONAL FLOW, BOUNDARY LAYER, JET MIXING FLOW, AXIALLY SYMMETRIC FLOW, FLOW FIELDS, BOUNDARY VALUE PROBLEMS, THRUST VECTOR CONTROL SYSTEMS, ANGLE OF ATTACK, YAW, FLIGHT, FLAPS, DIGITAL COMPUTERS (U)
IDENTIFIERS: FAN-IN-WING CONFIGURATIONS, *LIFT FANS, CDC-6000 PROGRAMS, FORTRAN, ASCENT PROGRAMMING LANGUAGE (U)

THE REPORT DESCRIBES A DIGITAL COMPUTER PROGRAM DEVELOPED TO STUDY THE AERODYNAMIC CHARACTERISTICS OF FAN-IN-WING CONFIGURATIONS. THE PROGRAM IS WRITTEN IN THE FORTRAN IV AND ASCENT LANGUAGES FOR THE CONTROL DATA CORPORATION 6000-SERIES DIGITAL COMPUTERS. THREE BASIC PACKAGES ARE PROVIDED BY THE PROGRAM: A GEOMETRY PACKAGE PRODUCES A DETAILED DESCRIPTION OF THE CONFIGURATION, AN AERODYNAMIC PACKAGE PROVIDES A THEORETICAL SOLUTION FOR THE POTENTIAL FLOW ABOUT THE CONFIGURATION, AND A BOUNDARY-LAYER PACKAGE FURNISHES THE BOUNDARY-LAYER CHARACTERISTICS ON THE WING SURFACE. THE REPORT PROVIDES A DESCRIPTION OF THE PROGRAM, FLOW CHARTS AND SEGMENTATION STRUCTURE DIAGRAMS, AND INPUT DATA FORMATS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-667 983 1/3
PRINCETON UNIV N J DEPT OF AEROSPACE AND MECHANICAL SCIENCES

COMPARISON OF LONGITUDINAL STABILITY CHARACTERISTICS OF THREE TILT-WING VTOL AIRCRAFT DESIGNS, (U)

JAN 66 102P CURNUTT,R. A; CURTISS,H. C., JR;
REPT. NO. 749
CONTRACT: DA-44-177-AMC-8(T)
PROJ: DA-1P125901A142
TASK: 1P125901A14233
MONITOR: USAAVLABS TR-66-64

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, PITCH(MOTION)), (*TRANSPORT PLANES, PITCH(MOTION)), RESEARCH PLANES, CONVERTIBLE PLANES, TILT WINGS, STABILITY, DESIGN, RESPONSE, MODEL TESTS, SCALE, WIND TUNNEL MODELS, AIRPLANE MODELS, ANALOG COMPUTERS, AERODYNAMIC CHARACTERISTICS, CORRELATION TECHNIQUES (U)
IDENTIFIERS: C-142 AIRCRAFT, XC-142A AIRCRAFT, VZ-2 AIRCRAFT, TRIM(AIRCRAFT), ANGLE OF INCIDENCE (U)

EXPERIMENTAL VALUES OF THE LONGITUDINAL STABILITY DERIVATIVES OF THREE TILT-WING VTOL AIRCRAFT CONFIGURATIONS AS OBTAINED FROM TESTS OF SEVERAL MODELS ARE PRESENTED. RESULTS FROM THE NASA FULL-SCALE WIND TUNNEL AT LANGLEY FIELD, THE PRINCETON TRACK, THE LTV AEROSPACE CORPORATION WIND TUNNEL AND FLIGHT TEST ARE INCLUDED. AN ANALYSIS IS INCLUDED WHICH UTILIZES ROOT-LOCUS AND ANALOG COMPUTER STUDIES TO COMPARE THE CHARACTERISTIC ROOTS AND TRANSIENT RESPONSE OF THE AIRCRAFT AS THE LONGITUDINAL DERIVATIVES ARE VARIED WITHIN THE RANGE EXHIBITED BY THESE DATA. TRIM CONDITIONS AT WING INCIDENCES FROM 20 TO 90 DEGREES ARE CONSIDERED. THE THREE CONFIGURATIONS INCLUDED IN THE ANALYSIS WERE FOUND TO EXHIBIT QUITE SIMILAR STABILITY CHARACTERISTICS IN THE LOW-SPEED REGIME. GOOD CORRELATION WAS FOUND TO EXIST BETWEEN NASA WIND TUNNEL DATA AND PRINCETON DYNAMIC MODEL TRACK DATA FOR THE VZ-2 AIRCRAFT. CONSIDERATION IS GIVEN TO THE IMPORTANCE OF VARIOUS DERIVATIVES IN DETERMINING THE RESPONSE CHARACTERISTICS. A LARGE NUMBER OF ANALOG COMPUTER TRACES ARE INCLUDED, (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-667 989 21/5 1/3
GENERAL ELECTRIC CO CINCINNATI OHIO FLIGHT PROPULSION DIV

INVESTIGATIONS OF A VARIABLE AREA SCROLL FOR POWER TRANSFER IN TIP TURBINE LIFT FAN SYSTEMS. (U)

DESCRIPTIVE NOTE: FINAL REPT. JUN 64-DEC 66,
NOV 67 623P SMITH,EUGENE G. ;
CONTRACT: DA-44-177-AMC-220(T)
PROJ: DA-1F131201D161
MONITOR: USAAVLABS TR-67-26

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *GAS TURBINES), (*VARIABLE AREA NOZZLES, *STABILIZATION SYSTEMS), PERFORMANCE(ENGINEERING), AXIAL-FLOW TURBINES, GAS GENERATING SYSTEMS, FLIGHT CONTROL SYSTEMS, ANALOG COMPUTERS, SIMULATION, ROLL, MAIERIALS, DESIGN, TURBINE WHEELS, GAS TURBINE ROTORS, STRESSES, ANALOG SYSTEMS, AERODYNAMIC CHARACTERISTICS (U)
IDENTIFIERS: *TIP TURBINES, *LIFT FANS, V-5 AIRCRAFT, XV-5A AIRCRAFT, A353-5A FANS, LF2 ROTORS, J-85 ENGINES, YJ85-GE-5 ENGINES, JAZZERS, VARIABLE AREA SCROLLS, *POWER TRANSFER SYSTEMS (U)

DEMONSTRATION TESTS AND ANALOG SIMULATIONS WERE PERFORMED FOR THE VARIABLE AREA SCROLL POWER TRANSFER APPLICABLE FOR THRUST CONTROL OF TIP TURBINE DRIVEN LIFT FANS. THE TIP TURBINE DRIVEN LIFT FAN USED THE LIGHTWEIGHT LF2 ROTOR. CONTROL RESPONSE RATES OF 0.31 SECOND FOR ROLL CONTROL AND 0.10 SECOND FOR HEIGHT CONTROL WERE DEMONSTRATED. THE JAZZER, AN ANTICIPATORY DEVICE, IMPROVED THE RESPONSE TO ABOUT ONE-HALF THE ORIGINAL LEVEL. AERODYNAMIC PERFORMANCE OF THE SYSTEM MET OR EXCEEDED OBJECTIVE LEVELS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-668 006 1/3 14/2 5/9
BELL AEROSYSTEMS CO BUFFALO N Y

STUDY, SURVEY OF HELICOPTER AND V/STOL AIRCRAFT SIMULATOR TRAINER DYNAMIC RESPONSE. VOLUME II. DYNAMIC RESPONSE CRITERIA FOR V/STOL AIRCRAFT FLIGHT TRAINERS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
MAY 67 187P STREIFF,H. G. ;
CONTRACT: N61339-1753
PROJ: 7681-1
MONITOR: NAVTRADEVCEN 1753-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME I, AD-668 005.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FLIGHT SIMULATORS), (*FLIGHT SIMULATORS, STANDARDS), SHORT TAKE-OFF PLANES, HELICOPTERS, PERFORMANCE(ENGINEERING), AERODYNAMIC CHARACTERISTICS, TRAINING DEVICES, DESIGN, HANDLING, EQUATIONS OF MOTION, PILOTS, RESPONSE, COMPUTER PROGRAMS, FLIGHT CONTROL SYSTEMS, SIMULATION (U)

THE RESULTS OF A STUDY TO DETERMINE THE DYNAMIC RESPONSE CRITERIA FOR V/STOL AIRCRAFT SIMULATOR TRAINERS ARE PRESENTED. THE FUNDAMENTALS OF V/STOL DYNAMICS, CONTROL, AND SIMULATION WITHIN THE VARIOUS V/STOL FLIGHT REGIMES ARE DESCRIBED. DIFFICULTIES LIKELY TO BE ENCOUNTERED IN DEVELOPING AN ADEQUATE V/STOL AIRCRAFT SIMULATION ARE ALSO PRESENTED. METHODS AND PROCEDURES FOR DETERMINING THE ACCURACY TO WHICH SPECIFIC DYNAMIC RESPONSE PARAMETERS MUST BE SIMULATED ARE PRESENTED, AND BASED UPON THESE, SIMULATION TOLERANCES ARE DEVELOPED FOR EACH SIGNIFICANT HANDLING QUALITIES PARAMETER IN EACH FLIGHT REGIME. THE DYNAMIC ATTRIBUTES OF THE PILOT-AIRCRAFT COMBINATION WITH REGARD TO EACH SPECIFIC PARAMETER ARE DISCUSSED. A DETAILED DESCRIPTION OF VARIOUS V/STOL AIRCRAFT EQUATIONS OF MOTION, TRANSFER FUNCTIONS, AND MODES OF MOTION IS INCLUDED AND THE PRACTICAL LIMITATIONS OF VARIOUS METHODS AND PROCEDURES FOR PROGRAMMING THE EQUATIONS OF MOTION FOR PILOTED FLIGHT SIMULATION PURPOSES ARE DISCUSSED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-668 714 1/3
LTV AEROSPACE CORP DALLAS TEX LTV VOUGHT AERONAUTICS DIV

RESEARCH ON VTOL WATER HOVER EFFECTS, INCLUDING THE EFFECTS OF WIND AND WAVES. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
APR 68 241P MARSH,KEITH R. ;
REPT. NO. 2-55400/8R-6140
CONTRACT: N00014-67-C-0488
PROJ: NR-212-167

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, HOVERING), (*WATER, DOWNWASH), TACTICAL AIR SUPPORT, TILT WINGS, OCEANS, WATER WAVES, WIND, MODELS(SIMULATIONS), ALL-WEATHER AVIATION, ANTISUBMARINE WARFARE, SEA RESCUES, SURFACE PROPERTIES, TEST FACILITIES, TEST EQUIPMENT, DATA PROCESSING SYSTEMS, STABILITY, DIGITAL SYSTEMS, PHOTOGRAPHIC EQUIPMENT, TEST METHODS, MODEL TESTS (U)

VERY LITTLE IS KNOWN ABOUT THE PROBLEMS ASSOCIATED WITH A VTOL AIRCRAFT HOVERING OVER A WATER SURFACE. SOME OF THE MORE IMPORTANT OF THESE UNKNOWN EFFECTS APPEAR TO BE THE EFFECTS OF SURFACE WINDS AND WAVES ON THE STABILITY AND CONTROL CHARACTERISTICS OF THE HOVERING AIRPLANE, THE EFFECTS OF THE AIRPLANE'S DOWNWASH ON THE WATER SURFACE, AND THE EFFECTS OF SURFACE WINDS AND WAVES ON THE SPRAY GENERATED BY THE AIRPLANE'S DOWNWASH. IN ORDER TO EXAMINE THESE SEEMINGLY MORE IMPORTANT EFFECTS, A SPECIAL MODEL TESTING FACILITY HAS BEEN BUILT. THIS FACILITY PERMITS A MODEL SIMULATING A HOVERING AIRPLANE TO BE TESTED AS THE FACILITY GENERATES WAVES OF VARIABLE HEIGHTS AND LENGTHS ON THE WATER SURFACE BELOW THE MODEL TEST STATION. THE FACILITY CAN ALSO GENERATE A SURFACE WIND. DURING THIS TEST A MODEL OF A TILTING VTOL AIRPLANE WITH FOUR PROPELLERS WAS TESTED AS IT SIMULATED HOVER AT VARYING HEIGHTS AND DISK LOADINGS ABOVE THE VARIABLE WATER SURFACE CONDITIONS. THE EFFECTS OF WATER WAVES ON THE FORCES AND MOMENTS FELT BY THE HOVERING MODEL WERE FOUND TO BE NEGLIGIBLE, AND THE EFFECTS OF THE SURFACE WIND ON THE FORCES AND MOMENTS WERE FOUND TO BE AS WOULD BE PREDICTED WITH A NEGLIGIBLE EFFECT OF WAVES EVEN WITH THE SURFACE WIND. [redacted] (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-669 226 1/3 1/1 20/4
ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT
PARIS (FRANCE)

FLUID DYNAMICS OF ROTOR AND FAN SUPPORTED AIRCRAFT AT SUBSONIC SPEEDS. (U)

DESCRIPTIVE NOTE: CONFERENCE PROCEEDINGS.
SEP 67 597P
REPT. NO. AGARD-CP-24

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: NATO FURNISHED. PRESENTED AT A SPECIALISTS' MEETING OF THE FLUID DYNAMICS PANEL OF AGARD, GOETTINGEN (GERMANY) 11-13 SEP 67.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, SYMPOSIA), HELICOPTERS, HELICOPTER ROTORS, ROTARY WINGS, AERODYNAMIC CHARACTERISTICS, WIND TUNNEL MODELS, MODEL TESTS, FANS, AEROELASTICITY, JETS, LIFT, DEFLECTION, PROPELLERS(AERIAL), AIRPLANE NOISE, VORTICES, SHORT TAKE-OFF PLANES (U)
IDENTIFIERS: STOWED ROTOR AIRCRAFT, CROSS FLOW, LIFT FANS, TRANSITION FLIGHT (U)

THE COLLECTION OF PAPERS EMPHASIZES THE FOLLOWING AREAS: ROTORS AND FANS IN HOVER AND TRANSITION, INTERFERENCE WITH THE AIRFRAME AND THE GROUND, GROUND EFFECTS ON ROTORS AND FANS, NOISE PROBLEMS AND TESTING TECHNIQUES. THE TOPICS ARE BASED ON LOW-DISCLOADING DEVICES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-670 965 1/3 15/7
LTV AEROSPACE CORP DALLAS TEX LTV VOUGHT AERONAUTICS DIV

DYNAMIC RESPONSE OF THE XC-142A TILT-WING V/STOL AIRCRAFT TO IN-FLIGHT CARGO DELIVERY AT SLOW SPEEDS.(U)

DESCRIPTIVE NOTE: FINAL REPT.,
MAR 68 123P WILSON,JERRY W. ;SCHIRA, MIKE P. ;DEITERING,J. STEVE ;
REPT. NO. 2-53310/6R-6098
CONTRACT: DA-44-177-AMC-327(T)
PROJ: DA-1F121401A254
MONITOR: USAAVLABS TR-68-4

UNCLASSIFIED REPORT

DESCRIPTORS: (*TRANSPORT PLANES, *AIR DROP OPERATIONS), (*VERTICAL TAKE-OFF PLANES, AIR DROP OPERATIONS), CARGO, AIRSPEED, PAYLOAD, HOVERING, GROUND EFFECT, CARGO PARACHUTES, MILITARY PERSONNEL, TILT WINGS, SIMULATION, MATHEMATICAL MODELS (U)
IDENTIFIERS: XC-142A AIRCRAFT, C-142 AIRCRAFT, TRANSITION FLIGHT, EXTRACTION PARACHUTES, GRAPHS(CHARTS) (U)

THE POTENTIAL ABILITY OF V/STOL AIRCRAFT TO PERFORM ARMY DROP MISSIONS AT VARIOUS ALTITUDES WHILE FLYING AT SPEEDS FROM HOVER TO CONVENTIONAL FLIGHT COULD PROVIDE A BASIS FOR PRECISION IN-FLIGHT DELIVERY AND COULD OVERCOME MAJOR OPERATIONAL RESTRICTIONS ASSOCIATED WITH MANY OF THE CONVENTIONAL AIR-DROP TECHNIQUES. THE STUDY WAS PARTIALLY BASED ON ACTUAL AIR-DROP DEMONSTRATIONS. SINGLE CARGO LOADS OF UP TO 3,000 POUNDS WERE GRAVITY DROPPED IN HOVER AND AT 30 KNOTS, AND LOADS OF UP TO 4,000 POUNDS WERE EXTRACTED BY PARACHUTE AT 127 KNOTS. USING THESE FLIGHT DATA TO SET UP A REALISTIC SIMULATION, A MATHEMATICAL MODEL OF THE XC-142A AIRPLANE AND A HUMAN PILOT WERE USED TO EXAMINE THE AIRCRAFT'S RESPONSE WITH CARGO WEIGHTS UP TO THE AIRPLANE'S MAXIMUM PAYLOAD OF 8,000 POUNDS IN THE LOW-SPEED PORTION OF TRANSITION AND 12,000 POUNDS AT A 127-KNOT FLIGHT CONDITION. THE STUDY SHOWS THAT THE MAXIMUM PAYLOAD COULD BE SUCCESSFULLY DROPPED WITH PROPER PILOT TECHNIQUE. MEANS OF EXTENDING THE AIRPLANE'S AIR-DROP CAPABILITY THROUGH THE USE OF SPECIAL EXTRACTION FORCES AND PARAMETERS APPLICABLE TO THE AIR-DROP SYSTEM WERE STUDIED.
(AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-671 029 1/3
HAMILTON STANDARD WINDSOR LOCKS CONN

FEASIBILITY STUDY OF ADVANCED V/STOL PROPELLER TECHNOLOGY. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JUN 68 385P ADAMSON,W. M. ;
CONTRACT: DAAJ02-67-C-0073
PROJ: DA-1G121401D144
TASK: 1G121401D14415
MONITOR: USAAVLABS TR-68-33

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, WEIGHT), (*PROPELLERS(AERIAL), WEIGHT), FEASIBILITY STUDIES, PROPULSION GEARS, REDUCTION GEARS, OPTIMIZATION, REDUCTION, DESIGN, PITCH(MOTION), BORON, PROPELLER BLADES, TITANIUM (U)
IDENTIFIERS: TRADEOFFS (U)

A FEASIBILITY STUDY OF ADVANCED V/STOL PROPELLER SYSTEMS FOR THE 1970-1975 TIME PERIOD WAS CONDUCTED. THE PRIMARY OBJECTIVE OF THE STUDY WAS TO INVESTIGATE THE APPLICATION OF NEW MATERIALS AND NEW DESIGN CONCEPTS TO DEFINE THE MAXIMUM REDUCTIONS IN SPECIFIC WEIGHT OF THE COMPLETE PROPELLER SYSTEM (INCLUDING REDUCTION GEARBOX) ATTAINABLE IN THIS TIME PERIOD. PRELIMINARY DESIGNS OF FUTURE PROPELLER SYSTEMS PRESENTED IN THE REPORT ARE OVER 50 PERCENT LIGHTER THAN COMPARABLE PRESENT-DAY V/STOL SYSTEMS. THREE INTEGRAL GEARBOX PROPELLER SYSTEMS, WITH AND WITHOUT CYCLIC PITCH AND WITH AND WITHOUT A CROSS-SHAFT DRIVE PAD, WERE DEFINED IN THIS REPORT USING THE ADVANCED TECHNOLOGY INDICATED AS FEASIBLE BY THE STUDY. EACH MAJOR COMPONENT OF THE IGB PROPELLER SYSTEM WAS OPTIMIZED AND THEN MERGED INTO COMPLETE SYSTEM DESIGNS. A SUMMARY WEIGHT TABULATION IS PRESENTED SHOWING THE RELATIVE CONTRIBUTIONS OF EACH MAJOR COMPONENT OF THE PROPELLER SYSTEM TO THE TOTAL INDICATED WEIGHT REDUCTIONS. A SIGNIFICANT PORTION OF THE WEIGHT REDUCTIONS IS SHOWN TO BE ACHIEVABLE BY 1970, SINCE THE TECHNOLOGY REQUIRED IS PRESENTLY UNDER DEVELOPMENT OR IS A NATURAL EXTENSION OF EXISTING TECHNOLOGY. OTHER SIGNIFICANT WEIGHT REDUCTIONS, SUCH AS THOSE RESULTING FROM THE USE OF BORON BLADE SPARS AND TITANIUM GEARING, ARE AT AN EARLY PHASE OF THEIR TECHNOLOGY DEVELOPMENT (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-671 041 1/3 20/4 1/1
WASHINGTON UNIV SEATTLE DEPT OF AERONAUTICS AND ASTRONAUTICS

AN EXPERIMENTAL STUDY OF ALLEVIATING THE LIMITS ON MINIMUM-SPEED V/STOL WIND-TUNNEL TESTS, (U)

JAN 68 27P SHINDO,SHOJIRO ;RAE,WILLIAM H. , JR;
REPT. NO. 68-1
CONTRACT: DA-ARO(D)-31-124-G481
PROJ: DA-20014501B33G
MONITOR: ARDD 4506:3-E

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, MODEL TESTS), AERODYNAMIC CONFIGURATIONS, ROTARY WINGS, AERODYNAMIC LOADING, AERODYNAMIC CHARACTERISTICS, SHORT TAKE-OFF PLANES, WIND TUNNEL MODELS, DOWNWASH, WAKE, HOVERING (U)
IDENTIFIERS: FLOW BREAKDOWN, FENCES(AERODYNAMICS), TRANSITION FLIGHT (U)

AN EXPERIMENTAL STUDY WAS MADE TO INVESTIGATE SOME MEANS TO ALLEVIATE FLOW BREAKDOWN BY USING A NUMBER OF DIFFERENT STRAKE OR FENCE CONFIGURATIONS. A TOTAL OF 23 DIFFERENT CONFIGURATIONS WERE STUDIED IN THE 4 X 6 FT. INSERT WITH A 2 FT. DIAMETER RIGID ROTOR AT ABOUT 7 PSF DISK LOADING. NONE OF THE STRAKE CONFIGURATIONS STUDIED IN THE EXPERIMENT COMPLETELY ELIMINATE THE EFFECT OF FLOW BREAKDOWN. A FURTHER EXPERIMENTAL INVESTIGATION IS DESIRABLE BECAUSE OF THE INCREASING INTEREST IN TESTING V/STOL VEHICLES IN THE TRANSITION SPEED RANGE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-672 272 1/3 5/8
BOLT BERANEK AND NEWMAN INC CAMBRIDGE MASS

AN OPTIMAL CONTROL METHOD FOR PREDICTING CONTROL CHARACTERISTICS AND DISPLAY REQUIREMENTS OF MANNED-VEHICLE SYSTEMS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUL 66-31 AUG 67, JUN 68 173P ELKIND,JEROME I. ;FALB, PETER L. ;KLEINMAN,DAVID ;LEVISON,WILLIAM H. ;
REPT. NO. BBN-1559
CONTRACT: AF 33(615)-5160
PROJ: AF-8219
TASK: 821910
MONITOR: AFFDL TR-67-187

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *FLIGHT CONTROL SYSTEMS), SHORT TAKE-OFF PLANES, MAN-MACHINE SYSTEMS, DISPLAY SYSTEMS, ANALYSIS, MATHEMATICAL MODELS, OPTIMIZATION, TIME, HOVERING, GAIN, MATHEMATICAL PREDICTION, PILOTS, PERFORMANCE(HUMAN) (U)
IDENTIFIERS: XV-5A AIRCRAFT, OPTIMAL CONTROL THEORY, V-5 AIRCRAFT (U)

AN ANALYTIC PROCEDURE FOR DETERMINING INFORMATION DISPLAY REQUIREMENTS AND HUMAN CONTROL AND INSTRUMENT MONITORING CHARACTERISTICS FOR COMPLEX MULTIVARIABLE VEHICULAR CONTROL SYSTEMS IS DEVELOPED. THE METHOD IS BASED UPON THE ASSUMPTION THAT THE HUMAN CONTROLLER WILL ACT IN A NEAR OPTIMAL MANNER. OPTIMAL CONTROL THEORY AND ITS ASSOCIATED STATE-SPACE REPRESENTATION IS USED AS THE BASIS FOR THE ANALYTIC PROCEDURE. A MODEL FOR THE HUMAN CONTROLLER IS DEVELOPED IN WHICH THE CONTROLLER'S INHERENT LIMITATIONS ARE APPROXIMATED BY A TIME DELAY. THE MODEL INCLUDES A PREDICTOR FOR COMPENSATING FOR THIS TIME DELAY, A CONTROLLER FOR PRODUCING THE CONTROL INPUTS TO THE VEHICLE AND A COST FUNCTIONAL THAT IS TO BE MINIMIZED. THE CONTROLLER IS ASSUMED TO BE OPTIMAL. SEVERAL SUBOPTIMAL PREDICTORS ARE INVESTIGATED. ONLY QUADRATIC COST FUNCTIONALS ARE CONSIDERED. THE ANALYTIC PROCEDURE ASSUMES THAT THE HUMAN OPERATOR'S CONTROL CHARACTERISTICS CAN BE REPRESENTED BY A SET OF GAINS OPERATING ON THE DELAYED STATE VARIABLES OF THE SYSTEM.

(U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-703 882 1/3 1/2
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

VERTICAL TAKEOFF AND LANDING. (U)

FEB 70 120P PAVLENKO,V. F. ;
REPT. NO. FTD-MT-24-379-69
PROJ: FTD-7230278

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF MONO. VERTIKALNYI VZLET I POSADKA, MOSCOW, 1968 P1-112, BY ROBERT ALLEN POTTS.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, PERFORMANCE(ENGINEERING)), TAKE-OFF, AIRCRAFT LANDINGS, HELICOPTERS, AIRCRAFT ENGINES, FLIGHT CONTROL SYSTEMS, STABILIZATION, AVIATION SAFETY, JETS, FLIGHT, USSR (U)
IDENTIFIERS: ROTARY WING AIRCRAFT, TRANSLATIONS (U)

CONTENTS: CERTAIN CHARACTERISTICS OF FLIGHTS IN NATURE; HELICOPTERS AND ROTARY WING AIRCRAFT; VTOL AIRCRAFT; VTOL AIRCRAFT POWER PLANTS; STABILIZATION AND CONTROL OF VTOL; TRANSITION CONDITIONS OF FLIGHT OF VTOL AIRCRAFT; FLIGHT SAFETY OF VTOL AIRCRAFT; EFFECT OF A GAS JET ON THE TAKEOFF-LANDING SITE; ANOMALIES OF FLIGHT CHARACTERISTICS OF VTOL. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-709 562 5/10 1/3
BOLT BERANEK AND NEWMAN INC CAMBRIDGE MASS

APPLICATION OF OPTIMAL CONTROL THEORY TO THE PREDICTION OF HUMAN PERFORMANCE IN A COMPLEX TASK. (U)

DESCRIPTIVE NOTE: FINAL REPT. JAN 68-SEP 69,
MAR 70 156P BARON,SHELDON ;ELKIND,JEROME I. ;KLEINMAN,DAVID L. ;MILLER,DUNCANC. ; LEVISON,WILLIAM H. ;
REPT. NO. BBN-1776
CONTRACT: F33615-68-C-1192
PROJ: AF-8219
MONITOR: AFFDL TR-69-81

UNCLASSIFIED REPORT

DESCRIPTORS: (*REACTION(PSYCHOLOGY), THEORY), (*PERFORMANCE(HUMAN), MATHEMATICAL PREDICTION), (*VERTICAL TAKE-OFF PLANES, HANDLING), HOVERING, SCIENTIFIC RESEARCH, MATHEMATICAL MODELS, PROGRAMMING(COMPUTERS), FEEDBACK, PITCH(MOTION), FLIGHT CONTROL SYSTEMS, SCANNING, AIR FORCE RESEARCH, HUMAN ENGINEERING (U)
IDENTIFIERS: XV-5A AIRCRAFT, V-5 AIRCRAFT, CONTROL THEORY, FEEDBACK CONTROL, TASK COMPLEXITY, MANUAL CONTROL TASKS (U)

A PROCEDURE IS DEVELOPED FOR USING HUMAN RESPONSE THEORY AND THE ANALYTIC METHODS OF OPTIMAL CONTROL THEORY TO ANALYZE A COMPLEX MANUAL CONTROL TASK. THE CENTRAL ELEMENT IN THE PROCEDURES IS A MODEL OF THE HUMAN OPERATOR THAT IS BASED ON THE ASSUMPTION THAT WELL-TRAINED OPERATORS PERFORM OPTIMALLY SUBJECT TO CERTAIN INHERENT LIMITATIONS. RECENT RESULTS IN HUMAN RESPONSE THEORY PROVIDE THE REPRESENTATION OF THE HUMAN'S LIMITATIONS. OPTIMAL CONTROL THEORY IS THEN USED TO PREDICT CLOSED-LOOP HUMAN AND SYSTEM PERFORMANCE. THE MANUAL CONTROL OF THE LONGITUDINAL POSITION OF A HOVERING VTOL VEHICLE IS ANALYZED USING THE DEVELOPED TECHNIQUES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-706 374 1/3
BELL HELICOPTER CO FORT WORTH TEX

A STABILITY AND CONTROL PREDICTION METHOD FOR HELICOPTERS AND STOPPABLE ROTOR AIRCRAFT. VOLUME III: PROGRAMMER'S MANUAL. (U)

DESCRIPTIVE NOTE: FINAL REPT. DEC 68-FEB 70, MAR 70 37P BIRD,BILLY J. ;
CONTRACT: F33615-69-C-1121
PROJ: AF-8219
TASK: 821907
MONITOR: AFFDL TR-69-123-VOL-3

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 2, AD-706 918, AND VOLUME 4, AD-706 919.

DESCRIPTORS: (*HELICOPTERS, STABILITY), (*VERTICAL TAKE-OFF PLANES, STABILITY), INSTRUCTION MANUALS, SUBROUTINES, ROTOR BLADES(ROTARY WINGS), HELICOPTER ROTORS, PROGRAMMING(COMPUTERS), CONTROL, DIGITAL COMPUTERS (U)
IDENTIFIERS: *STOPPABLE ROTOR AIRCRAFT (U)

THE REPORT DESCRIBES A MATHEMATICAL MODEL OF ROTORCRAFT THAT MAY BE USED TO DETERMINE CHARACTERISTICS OF PERFORMANCE, STABILITY, RESPONSE, AND ROTOR BLADE LOADS. THE COMPLEXITY OF THE EQUATIONS USED REQUIRES THE USE OF A DIGITAL COMPUTER FOR EFFICIENT SOLUTION. THIS VOLUME CONTAINS AIDS FOR THE COMPUTER PROGRAMMER. THE PROGRAMMING AIDS ARE DIVIDED INTO TWO GROUPS: BACKGROUND MATERIAL FOR THE PROGRAMMER JUST STARTING TO WORK ON THIS COMPUTER PROGRAM AND THE DETAILED EXPLANATION OF THE COMPUTER GENERATED DOCUMENTATION WHICH IS NECESSARY FOR ANY PROGRAMMER TO WORK EFFECTIVELY ON THIS PROGRAM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-706 918 1/3
BELL HELICOPTER CO FORT WORTH TEX

A STABILITY AND CONTROL PREDICTION METHOD FOR HELICOPTERS AND STOPPABLE ROTOR AIRCRAFT. VOLUME II: USER'S MANUAL. (U)

DESCRIPTIVE NOTE: FINAL REPT. DEC 68-FEB 70,
FEB 70 164P BIRD,BILLY J. ;MCLARTY,
TYCE T. ;
CONTRACT: F33615-69-C-1121
PROJ: AF-8219
TASK: 821907
MONITOR: AFFDL TR-69-123-VOL-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 3, AD-706 374.

DESCRIPTORS: (*HELICOPTERS, STABILITY), (*VERTICAL TAKE-OFF PLANES, STABILITY), ROTOR BLADES(ROTARY WINGS), RESPONSE, LOADING(MECHANICS), PERFORMANCE(ENGINEERING), PROGRAMMING(COMPUTERS), EQUATIONS OF MOTION, HELICOPTER ROTORS, MATHEMATICAL PREDICTION, CONTROL (U)
IDENTIFIERS: *STOPPABLE ROTOR AIRCRAFT (U)

THE VOLUME PRESENTS ALL DOCUMENTATION AVAILABLE TO AID THE USER OF THE COMPUTER PROGRAM DEVELOPED IN THIS WORK. THE INPUT FORMAT SECTION PROVIDES AN EXPLANATION OF ALL OF THE QUANTITIES INPUT TO THE COMPUTER PROGRAM. MANY OF THE INPUTS ARE DEFINED BY EQUATIONS SHOWING HOW THEY FUNCTION IN THE PROGRAM. THIS MAKES THE USE OF THE INPUTS AS CLEAR AS POSSIBLE. FOUR TYPICAL SETS OF INPUT DATA ARE INCLUDED AS WORKING EXAMPLES. THE OUTPUT GUIDE GIVES A THOROUGH DISCUSSION OF ALL OF THE FORMS OF COMPUTER OUTPUT OBTAINED BY THE USER.
(AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-706 919 1/3
BELL HELICOPTER CO FORT WORTH TEX

A STABILITY AND CONTROL PREDICTION METHOD FOR HELICOPTERS AND STOPPABLE ROTOR AIRCRAFT. VOLUME IV: APPENDICES. (U)

DESCRIPTIVE NOTE: FINAL REPT. DEC 68-FEB 70, MAR 70 312P BIRD,BILLY J. ;
CONTRACT: F33615-69-C-1121
PROJ: AF-8219
TASK: 821907
MONITOR: AFFDL TR-69-123-VOL-4

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 3, AD-706 374.

DESCRIPTORS: (*HELICOPTERS, STABILITY), (*VERTICAL TAKE-OFF PLANES, STABILITY), SUBROUTINES, COMPUTER PROGRAMS, ROTOR BLADES(ROTARY WINGS), HELICOPTER ROTORS, CONTROL, PERFORMANCE(ENGINEERING) (U)
IDENTIFIERS: *STOPPABLE ROTOR AIRCRAFT (U)

CONTENTS: VARIABLE DEFINITIONS; SUBROUTINES AND COMMONS CONTAINING EACH COMMON AND VARIABLE; COMMONS AND VARIABLES IN EACH SUBROUTINE AND COMMON; SUBROUTINES CONTAINING EACH VARIABLE, BY COMMON; PROGRAM SECTIONS CONTAINING EACH VARIABLE, BY COMMON; AND FORTRAN LISTING. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-707 831 1/3
CORNELL AERONAUTICAL LAB INC BUFFALO N Y FLIGHT RESEARCH DEPT

A FLIGHT INVESTIGATION OF LATERAL-DIRECTIONAL HANDLING QUALITIES FOR V/STOL AIRCRAFT IN LOW SPEED MANEUVERING FLIGHT. (U)

DESCRIPTIVE NOTE: FINAL REPT. AUG 68-AUG 69, MAR 70 189P DOETSCH,K-H. ; JR.;GOULD, D. G. ;MCGREGOR,D. M. ;
CONTRACT: AF 33(615)-3736
PROJ: AF-698DC
TASK: 698DC00
MONITOR: AFFDL TR-69-41

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH NATIONAL AERONAUTICAL ESTABLISHMENT, OTTAWA (ONTARIO), NAE-LTR-FR-12.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, HANDLING), ROLL, MANEUVERABILITY, FLIGHT SIMULATORS, FLIGHT TESTING, FLIGHT SPEEDS, APPROACH (U)

AN INVESTIGATION TO DETERMINE THE RANGES OF VARIOUS LATERAL DIRECTIONAL CHARACTERISTICS REQUIRED TO PROVIDE ADEQUATE FLYING QUALITIES FOR TURNING MANEUVERS AT LOW SPEED WAS UNDERTAKEN USING AN AIRBORNE V/STOL AIRCRAFT SIMULATOR. FIVE PARAMETERS WERE VARIED IN A SYSTEMATIC MANNER: THE DAMPING RATIO, THE FREQUENCY, AND THE RATIO AND THE FREQUENCY OF THE NUMERATOR OF THE ROLL-ANGLE TO AILERON-CONTROL-INPUT TRANSFER FUNCTION. THE PILOTS PERFORMED A LOW SPEED, VISUAL MANEUVERING TASK AND DOCUMENTED THEIR ASSESSMENT OF THE CHARACTERISTICS THROUGH EXTENSIVE COMMENTS AND A NUMERICAL RATING. THE REPORT PRESENTS ALL THE DATA CATEGORIZED WITH RESPECT TO THE TEST PARAMETERS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-708 742 1/3
AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO

PROPELLER STATIC PERFORMANCE TESTS FOR V/STOL AIRCRAFT. PART II. TEST DATA (APPENDIX III). (U)

DESCRIPTIVE NOTE: REPT. FOR JUL 65-NOV 67,
JAN 70 365P CHUPIN,MATTHEW H. ;
REPT. NO. ASD-TR-69-15-PT-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO PART I, AD-708 501.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *PROPELLERS(AERIAL)); (*TRANSPORT PLANES, PROPELLERS(AERIAL)), PERFORMANCE(ENGINEERING), EXPERIMENTAL DATA, STATICS, PROPELLER BLADES, DESIGN (U)
IDENTIFIERS: XC-142A AIRCRAFT, C-142 AIRCRAFT (U)

THE REPORT PRESENTS THE REDUCED DATA OBTAINED DURING AN EXTENSIVE SERIES OF PROPELLER STATIC PERFORMANCE TESTS WHICH WERE RUN BECAUSE OF A STATIC PERFORMANCE THRUST DEFICIENCY ENCOUNTERED DURING FLIGHT TESTS OF THE XC-142A V/STOL CARGO AIRCRAFT. THIRTEEN DIFFERENT PROPELLERS WERE USED; 28 DIFFERENT CONFIGURATIONS WERE OBTAINED BY CHANGING PARAMETERS OF SOME OF THE 13 BLADES. THE REDUCED DATA FOR THE 28 VERSIONS OF PROPELLERS TESTED ARE PRESENTED. PARAMETERS STUDIED DURING THE TESTS INCLUDED BLADE CUFF (ON OR OFF), TIP SHAPE, TWIST, ACTIVITY FACTOR, CAMBER, AND AIRFOIL SECTION. DATA ON SEVERAL OTHER STATIC THRUST PROPELLERS TESTED ON RIGS NOS. 1 AND 4, WHICH WERE NOT A PART OF THIS TEST SERIES, ARE ALSO PRESENTED FOR ADDITIONAL INFORMATION. THE INFORMATION OBTAINED FROM THE TESTS, IN EFFECT, REPRESENTS A STATE-OF-THE-ART STUDY FOR IMPROVING PROPELLER STATIC PERFORMANCE FOR V/STOL AIRCRAFT APPLICATIONS. THE INFORMATION OBTAINED DURING THESE TESTS CAN BE USED TO MORE ACCURATELY PREDICT STATIC THRUST FOR FUTURE PROPELLER DRIVEN V/STOL AIRCRAFT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-709 096 1/3 1/1
NAVAL POSTGRADUATE SCHOOL MONTEREY CALIF

AN INVESTIGATION OF GROUND EFFECT ON VERTICAL TAKEOFF AIRCRAFT. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
JUN 70 76P THOMPSON,CHARLES DOUGLAS I

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *GROUND EFFECT), PRESSURE, FUSELAGES, VELOCITY, NOZZLE GAS FLOW, JETS, THESES (U)

THE THEORETICAL SOLUTION FOR THE FLOW BENEATH V/ STOL AIRCRAFT WAS EXTENDED TO INCLUDE TILTED JET CONFIGURATIONS. A LABORATORY MODEL WAS CONSTRUCTED TO TEST THE EFFECT OF VARIATION OF THE PARAMETERS GOVERNING THE FLOW. FREE STREAMLINE PLOTS, PRESSURE COEFFICIENTS ON THE GROUND AND FUSELAGE AND VELOCITY PROFILES IN THE NOZZLES WERE DETERMINED FROM HOT-WIRE ANEMOMETER TRAVERSES AND MICROMANOMETER READINGS. EXPERIMETAL DATA COMPARED FAVORABLY WITH THE THEORETICAL DETERMINATIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-709 411 21/5
INTER-CONTROLS INC WASHINGTON D C

ENGINE CONTROL SYSTEMS STUDY AS APPLIED TO INTER-ENGINE THRUST CONTROL, (U)

JAN 70 246P CARRAS,ANDREW N. ;HUGHETT, PAUL W. ;
CONTRACT: N00019-68-C-0117

UNCLASSIFIED REPORT

DESCRIPTORS: (*TURBOFAN ENGINES, CONTROL SYSTEMS), (*VERTICAL TAKE-OFF PLANES, TURBOFAN ENGINES), (*GAS TURBINES, MATHEMATICAL MODELS), DUCTED FANS, TURBINE PARTS, LOGIC CIRCUITS, FUELS, LIQUID LEVEL CONTROL, FAILURE(MECHANICS), SIMULATION, COMPUTER PROGRAMS (U)
IDENTIFIERS: WTF-60 ENGINES, COMPUTERIZED SIMULATION, COMPUTER ANALYSIS, *ENGINE CONTROL SYSTEMS (U)

VTOL TYPE AIRCRAFT INCORPORATING TURBO-FAN ENGINES AS LIFTING MEANS DO NOT SENSIBLY LEND THEMSELVES TO THE CROSS-COUPLING PROVISIONS INHERENTLY AVAILABLE WITH THE SHAFTING OF PROPELLER TYPE ENGINES. AN ENGINE FAILURE IN THE FAN ENGINE CASE IS THEREFORE A CONSIDERABLY MORE PRECARIOUS MATTER FOR WHICH PROVISION FOR THRUST COMPENSATION MORE RESPONSIVE THAN A PILOT WOULD APPEAR TO BE REQUIRED. THE STUDY UTILIZES A VERY COMPREHENSIVE HYBRID SIMULATION OF THE WTF-60 ENGINE WHEREIN ALL ENGINE COMPONENTS ARE SIMULATED ON A PERFORMANCE MAP BASIS THEREBY INCLUDING ALL NON-LINEARITIES AS WELL AS PERMITTING THE AVAILABILITY OF ANY AND ALL ENGINE PARAMETERS FOR USE AS CONTROLLED VARIABLES OPERATING IN CONJUNCTION WITH THE MANIPULATED VARIABLE, FUEL FLOW. FURTHER, REALISTIC ACCELERATION CONTROL IN THE COURSE OF LARGE UPSETS IS ACCOMPLISHED THEREBY PERMITTING A CONTROL SYSTEM ANALYSIS WHICH IS COMPLETELY APPLICABLE TO THE DETAIL DESIGN OF THE CONTROL SYSTEM AND THE SELECTION OF COMPONENTS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-709 475 1/4
HONEYWELL INC MINNEAPOLIS MINN MANNED SYSTEMS TECHNOLOGY GROUP

AIRCRAFT DISPLAYS FOR STEEP-ANGLE APPROACHES. (U)

DESCRIPTIVE NOTE: FINAL REPT. NOV 67-DEC 68,
JUL 70 278P WOLF,JAMES D. ;HOPPE, RICHARD B. ;
REPT. NO. 12571-FR1
CONTRACT: N00014-68-C-0191
PROJ: NR-213-061
MONITOR: JANAIR 681215

UNCLASSIFIED REPORT

DESCRIPTORS: (*APPROACH, *DISPLAY SYSTEMS), (*HELICOPTERS, APPROACH), (*VERTICAL TAKE-OFF PLANES, APPROACH), AIRCRAFT LANDINGS, FLIGHT PATHS, MATHEMATICAL MODELS, SIMULATION (U)
IDENTIFIERS: UH-1 AIRCRAFT, H-1 AIRCRAFT, XV-5 AIRCRAFT, V-5 AIRCRAFT (U)

THE PRIMARY OBJECTIVE OF THE PROGRAM WAS TO INVESTIGATE AIRCRAFT DISPLAY REQUIREMENTS FOR STEEP-ANGLE APPROACHES AND LANDINGS WITH 1975-1980 ERA TACTICAL ROTARY-WING AND V/STOL AIRCRAFT. THE STUDY WAS CONDUCTED WITH VARIABLE-VELOCITY SIMULATIONS OF BELL UH-1 AND RYAN XV-5 AIRCRAFT. ALTERNATIVE DISPLAY FORMATS WERE DEVELOPED AND EMPIRICALLY EVALUATED BY MEANS OF REAL-TIME MAN-IN-THE-LOOP SIMULATION TECHNIQUES. IN ADDITION, APPROACH ANGLE AND PROFILE CHARACTERISTICS WERE SYSTEMATICALLY VARIED TO ASCERTAIN THEIR EFFECTS ON TASK PERFORMANCE. INTERPRETED WITHIN THE CONSTRAINTS IMPOSED UPON AND BY THE SIMULATIONS, RESULTS OF THE STUDY INDICATED THAT MANUALLY CONTROLLED IFR STEEP-ANGLE APPROACHES AND LANDINGS ARE POSSIBLE WITH ALL DISPLAY FORMATS EVALUATED. GENERALLY, HORIZONTAL SITUATION DISPLAY FORMATS WERE FOUND TO YIELD MORE ACCURATE AND PRECISE PILOTING PERFORMANCE WITH BOTH VEHICLES. EFFECTS OF APPROACH-PROFILE VARIATIONS WERE MINOR, WHILE EFFECTS OF APPROACH ANGLE DID VARY AS A FUNCTION OF THE VEHICLE FLOWN AND THE AXIS OF ERROR OR PERFORMANCE MEASUREMENT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-710 590 1/3
AIR FORCE FLIGHT DYNAMICS LAB WRIGHT-PATTERSON AFB OHIO

A NEW APPROACH TO THE SPECIFICATION AND EVALUATION OF FLYING QUALITIES. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JUN 70 71P ANDERSON,RONALD O. ;
REPT. NO. AFFDL-TR-69-120
PROJ: AF-8219
TASK: 821909

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, PERFORMANCE(ENGINEERING)), MAN-MACHINE SYSTEMS, PILOTS, HOVERING, MATHEMATICAL PREDICTION, SPECIFICATIONS, PERFORMANCE(HUMAN), FLIGHT CONTROL SYSTEMS (U)
IDENTIFIERS: EVALUATION (U)

A STUDY OF THE CORRELATION OF PILOT MODEL PARAMETERS AND CLOSED-LOOP PERFORMANCE WITH PILOT OPINION OF VTOL HOVER DYNAMICS WAS CONDUCTED. THE ENCOURAGING RESULTS SUGGESTED A PILOT-VEHICLE ANALYSIS METHOD OF PREDICTING PILOT MODEL PARAMETERS, CLOSED-LOOP PILOT-VEHICLE PERFORMANCE WITH GUST INPUTS, AND PILOT OPINION RATINGS FOR A WIDE RANGE OF VEHICLE DYNAMICS. THIS APPROACH WAS, IN TURN, USED TO PREDICT RATINGS FOR COMPARISON WITH FIXED BASE, MOVING BASE, AND FLIGHT TEST RESULTS FOR VFR CONDITIONS. AGAIN THE RESULTS WERE PROMISING, AND A NEW METHOD OF SPECIFYING HOVER DYNAMICS FOLLOWED NATURALLY. THE NEW PILOT-VEHICLE ANALYSIS CONCEPT, CALLED THE MINIMUM PILOT RATING METHOD, IS DISCUSSED IN TERMS OF APPLICATIONS TO OTHER TASKS, FLYING QUALITIES SPECIFICATION, AND CONTROL SYSTEM DESIGN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /20M07

AD-711 665 20/4 1/1 1/3
ARNOLD ENGINEERING DEVELOPMENT CENTER ARNOLD AIR FORCE STATION TENN

INVESTIGATION OF THE RECIRCULATION REGION OF A FLOW FIELD CAUSED BY A JET IN GROUND EFFECT WITH CROSSFLOW. (U)

DESCRIPTIVE NOTE: FINAL REPT. 19 MAR-30 APR 70,
SEP 70 30P BINION,T. W. , JR;
REPT. NO. AEDC-TR-70-192
CONTRACT: F40600-71-C-0002
PROJ: AF-8219, ARO-PD0084

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH ARO, INC., TULLAHOMA, TENN. REPT. NO. ARO-PWT-TR-70-202.

DESCRIPTORS: (*GROUND EFFECT, FLOW FIELDS), (*JETS, INTERACTIONS), (*VERTICAL TAKE-OFF PLANES, HOVERING), VELOCITY (U)
IDENTIFIERS: CROSS FLOW (U)

A WIND TUNNEL INVESTIGATION WAS CONDUCTED IN THE LOW SPEED WIND TUNNEL (V/STOL) TO DETERMINE THE VELOCITIES IN THE RECIRCULATION REGION OF THE FLOW FIELD PRODUCED BY THE INTERACTION OF A JET IMPINGING ON A GROUND PLANE WITH CROSSFLOW. AXIAL AND VERTICAL VELOCITY COMPONENT MEASUREMENTS WERE OBTAINED WITH A FORWARD-SCATTERING LASER DOPPLER VELOCIMETER. TEST RESULTS PROVIDE TWO-COMPONENT VELOCITY FIELDS AND INDICATE THAT THE JET-TO-FREE-STREAM VELOCITY RATIO IS MUCH MORE IMPORTANT IN DETERMINING THE FLOW FIELD THAN THE MAGNITUDE OF THE INDIVIDUAL VELOCITIES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-712 645 1/3
BOEING CO PHILADELPHIA PA VERTOL DIV

EVALUATION OF GEARED FLAP CONTROL SYSTEM FOR TILTWING V/STOL AIRCRAFT, (U)

AUG 70 108P CHURCHILL,G. B. ;
REPT. NO. D8-2076

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FLAPS), (*FLAPS, *FLIGHT CONTROL SYSTEMS), TILT WINGS, PITCH(MOTION), HOVERING, MOMENTS, ANGLE OF ATTACK, SERVOMECHANISMS, MODEL TESTS (U)
IDENTIFIERS: GEARED FLAP CONTROL SYSTEMS, TRANSITION FLIGHT, EVALUATION (U)

THE GEARED FLAP CONTROL SYSTEM PROVIDES A MEANS FOR CONTROLLING A TILTWING V/STOL AIRCRAFT IN HOVER AND TRANSITION FLIGHT WITHOUT THE USE OF AUXILIARY SYSTEMS SUCH AS CYCLIC PROPELLER PITCH OR TAIL JETS/ROTORS. THE SYSTEM IS BASED ON USING THE FLAP AS AN AERODYNAMIC SERVO TO POSITION THE WING RELATIVE TO THE FUSELAGE. ALTHOUGH THE SYSTEM IS MECHANICALLY SIMPLE, THE CONTROL CHARACTERISTICS ARE DIFFICULT TO VISUALIZE BECAUSE OF THE COUPLED BODY DYNAMICS INVOLVED. THEREFORE, A COMPREHENSIVE ANALYTICAL AND MODEL TESTING PROGRAM WAS PERFORMED TO EVALUATE THE SYSTEM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-713 587 1/4
ARMY AERONAUTICAL RESEARCH LAB MOFFETT FIELD CALIF

MASS FLOW, VELOCITY AND IN-FLIGHT THRUST MEASUREMENTS BY ION DEFLECTION. (U)

70 15P VAUSE,C. RANDE ;RUDLAND, ROBERT S. ;

UNCLASSIFIED REPORT

DESCRIPTORS: (*AIRSPEED INDICATORS, *VERTICAL TAKE-OFF PLANES), VELOCITY, THRUST, MEASUREMENT, IONS (U)
IDENTIFIERS: VAMS(VECTOR AIRSPEED MEASURING SYSTEMS), VECTOR AIRSPEED MEASURING SYSTEMS (U)

AN INVESTIGATION WAS MADE OF THE USE OF GASEOUS (ION) DISCHARGE SENSORS TO ACHIEVE ADEQUATE MEASURE OF AIRCRAFT VELOCITY AND INSTALLED THRUST. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-715 315 1/3
PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF AEROSPACE ENGINEERING

AN INVESTIGATION OF THE TRAILING VORTEX SYSTEM GENERATED BY A JET-FLAPPED WING OPERATING AT HIGH WING LIFT COEFFICIENTS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JUN 70 46P MCCORMICK,BARNES W. ;
SCHUMACHER,WILLIAM J. ;
CONTRACT: F33615-69-C-1165
PROJ: AF-1366
TASK: 136617
MONITOR: AFFDL TR-70-90

UNCLASSIFIED REPORT

DESCRIPTORS: (*VORTICES, TRAILING EDGE), (*JET FLAPS, VORTICES), (*VERTICAL TAKE-OFF PLANES, LIFT), WINGS, ANGLE OF ATTACK, ASPECT RATIO (U)
IDENTIFIERS: BLOWING (U)

THE PURPOSE OF THE INVESTIGATION WAS TO MEASURE THE GEOMETRY OF THE TRAILING VORTEX GENERATED BEHIND A JET-FLAPPED WING. SUCH VORTICES CAN POSE A SERIOUS HAZARD TO AIRCRAFT THAT PENETRATE THEM. PREVIOUS INVESTIGATIONS PERFORMED ON CONVENTIONAL WINGS INDICATE THAT THESE VORTICES PERSIST FOR SOME TIME AND HAVE MAXIMUM TANGENTIAL VELOCITIES WHICH INCREASE LINEARLY WITH THE LIFT COEFFICIENT. AS FUTURE AIRCRAFT MAY EMPLOY HIGH LIFT DEVICES SUCH AS JET-FLAPPED WINGS, THE VORTICES GENERATED COULD BE EVEN STRONGER. TWO SEMISPAN MODELS OF A JET-FLAPPED WING WERE TESTED IN A SUBSONIC WING TUNNEL. PARAMETERS VARIED DURING TESTING INCLUDED THE JET FLAP ANGLE, ANGLE OF ATTACK, ASPECT RATIO, AND JET MOMENTUM COEFFICIENT. VORTEX MEASUREMENTS WERE OBTAINED USING A VORTEX METER WHICH MEASURED THE ROTATIONAL SPEED OF THE FLUID WITHIN THE VORTEX. VALUES OBTAINED WERE NUMERICALLY INTEGRATED TO YIELD THE TANGENTIAL VELOCITY AND CIRCULATION DISTRIBUTED THROUGH THE VORTEX. EXPERIMENTAL RESULTS INDICATE THAT THE MAXIMUM TANGENTIAL VELOCITY INCREASES TO A MAXIMUM AND THEN DECREASES WITH CONTINUALLY INCREASING JET BLOWING. AT HIGH VALUES OF JET BLOWING, THE VORTEX WAS FOUND TO DECAY RAPIDLY DOWNSTREAM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-715 626 21/5
CURTISS-WRIGHT CORP WOOD-RIDGE N J

WTF-48 SINGLE ROTOR COMPRESSOR DEVELOPMENT. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT.,
NOV 70 59P MULLER,CHARLES H. ;
REPT. NO. CW-WR-69-098F
CONTRACT: N00019-69-C-0533

UNCLASSIFIED REPORT

DESCRIPTORS: (*COMPRESSOR ROTORS, DESIGN), (*VERTICAL TAKE-OFF PLANES, TURBOFAN ENGINES), (*TURBOFAN ENGINES, COMPRESSOR ROTORS), AXIAL-FLOW COMPRESSORS, AXIAL-FLOW COMPRESSOR BLADES, INLET GUIDE VANES, EXHAUST DIFFUSERS, GAS SEALS, CONFIGURATION, TEST METHODS (U)
IDENTIFIERS: WTF-48 ENGINES, *LIFT FAN ENGINES (U)

DEVELOPMENT OF THE REDUCED SCALE WTF-48 LIFT FAN ENGINE WAS CONTINUED UNDER THIS PROGRAM. THE OBJECTIVE OF THE PROGRAM WAS IMPROVEMENT OF THE PRESSURE RATIO, EFFICIENCY AND DIFFUSION OF THE COMPRESSOR ROTOR. THIS PROGRAM INVESTIGATED THE EFFECTS OF DEBLUNTING AND SWEEP OF THE ROTOR TRAILING EDGE AND MODIFICATION OF THE PASSAGE AREA SCHEDULE AND WALL CONTOURS. THE MODIFICATIONS INVESTIGATED IN THIS PROGRAM DID NOT PRODUCE INCREASED ROTOR PRESSURE RATIO OR EFFICIENCY. AN INCREASE OF 11% IN ROTOR STATIC PRESSURE, ACCOMPANIED BY A 20% REDUCTION IN DIFFUSER LOSSES, WAS ACCOMPLISHED. THIS IMPROVEMENT PRODUCED A 5 POINT INCREASE IN STAGE EFFICIENCY OF THE COMPRESSOR. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-715 939 20/1 1/3
AIR FORCE FLIGHT DYNAMICS LAB WRIGHT-PATTERSON AFB OHIO

THE ACOUSTIC ENVIRONMENT OF A DEFLECTED-JET VTOL AIRCRAFT. (U)

DESCRIPTIVE NOTE: TECHNICAL MEMO.,
SEP 70 43P SMITH,D. L. ;MCFARLAND, S. L. , JR;
REPT. NO. AFFDL-TM-70-1-FYA
PROJ: AF-1471
TASK: 147102

UNCLASSIFIED REPORT

DESCRIPTORS: (*AIRPLANE ENGINE NOISE, *VERTICAL TAKE-OFF PLANES), JETS, AERODYNAMIC NOISE, HOVERING, NOZZLE GAS FLOW, EXHAUST NOZZLES, DEFLECTION (U)
IDENTIFIERS: NOISE POLLUTION (U)

A NOISE SURVEY CONDUCTED ON A DEFLECTED-JET VTOL AIRCRAFT IS DESCRIBED. THE TEST AIRCRAFT WAS MOUNTED ON A VERTICAL THRUST STAND WITH THE NOZZLES ORIENTED IN THE 'HOVER-STOP' POSITION WHILE ENGINE RUNS WERE MADE AT DIFFERENT POWER SETTINGS. FORTY-ONE (41) MICROPHONES WERE LOCATED IN THE FIELD ON THE PORT SIDE OF THE AIRCRAFT AND SIX (6) MICROPHONES WERE LOCATED AT POSITIONS NEAR THE AIRCRAFT SKIN. THE HEIGHT OF THE FIELD MICROPHONES WAS VARIED (5 FT, 10 FT, AND 15 FT). ONE-THIRD OCTAVE BAND SPECTRA OBTAINED FROM ALL MICROPHONES AND FOR ALL ENGINE POWER SETTINGS WERE FLAT AND DID NOT EXHIBIT THE 'HAYSTACK' SHAPE WHICH IS CHARACTERISTIC OF A FREE JET. TYPICAL ONE-THIRD OCTAVE BAND SOUND PRESSURE LEVEL SPECTRA AND CONTOURS OF OVERALL SOUND PRESSURE LEVEL ARE PRESENTED. ESTIMATES OF JET TOTAL ACOUSTIC POWER ARE DEVELOPED FROM THE MEASUREMENTS AND RELATED TO ENGINE OPERATING PARAMETERS. EXPRESSIONS ARE DERIVED TO PREDICT THE ONE-THIRD OCTAVE BAND SPECTRA AT POSITIONS IN THE FIELD AND ON THE VEHICLE FROM SIMILARLY CONFIGURED AIRCRAFT FOR VARIOUS ENGINE OPERATING CONDITIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-718 121 1/1 20/4
LOCKHEED-GEORGIA CO MARIETTA

A THEORETICAL INVESTIGATION OF A CIRCULAR LIFTING JET IN A CROSS-FLOWING MAINSTREAM. (U)

DESCRIPTIVE NOTE: FINAL REPT. JUL 69-DEC 70, JAN 71 60P HACKETT,JAMES E. ;MILLER, H. RONALD ;
REPT. NO. LGR-ER-10940
CONTRACT: F33615-69-C-1753
PROJ: AF-6169BT
MONITOR: AFFDL TR-70-170

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *LIFT), (*JETS, LIFT), MATHEMATICAL PREDICTION, THEORY, PRESSURE, VORTICES, POTENTIAL THEORY (U)
IDENTIFIERS: CROSS FLOW (U)

FINITE-ELEMENT POTENTIAL-FLOW-MODELING THEORETICAL TECHNIQUES ARE DESCRIBED WHICH PREDICT, FROM FIRST PRINCIPLES, BOTH THE ROLLED-UP GEOMETRY AND THE PATH OF A ROUND LIFTING JET CONVERGENT INTO A CROSS-FLOWING MAINSTREAM, AS ON VTOL OR DIRECT LIFT-ASSISTED STOL AIRCRAFT. STARTING WITH A STRAIGHT-CYLINDER GEOMETRY, 'POINT' VORTEX ELEMENTS ARE PERTURBED USING A PRE DICTOR-CORRECTOR STEPPING METHOD TO GIVE A FIRST ESTIMATE OF THE BENT-BACK SHAPE, USING ASSUMED CIRCULATION VALUES. A COLLOCATION SCHEME IS NEXT USED TO REVISE THE CIRCULATION VALUES, AND AFTER THREE OR FOUR ITERATIONS, A FINAL EXIT-PLANE PRESSURE DISTRIBUTION MAY BE CALCULATED. THE FAN-INDUCED TOTAL PRESSURE RISE IS SIMULATED BY INJECTING VORTEX RINGS AT A CHOSEN POSITION IN TH DUCT WHICH FEEDS THE JET. SINCE THE SCOPE OF THE METHOD IS ENTIRELY NON-VISCOUS, SEPARATIONS TOWARD THE REAR OF REAL JETS AND THE ASSOCIATED PRESSURE CHANGES ARE NOT SIMULATED AND BASE-PRESSURE TYPE OF PRESSURES CANNOT BE EXPECTED. NEVERTHELESS, FOR FORWARD SPEED RATIOS OF 0.1, 0.2, 0.3 AND 0.4, THE LOW-PRESSURE CONTOURS AT EACH SIDE OF THE JET DO SHOW AN INCREASING REARWARD SHIFT, JUST AS IS FOUND EXPERIMENTALLY. SOMEWHAT SURPRISINGLY, THE SIMULATED PLUMES WERE MORE STABLE AT HIGHER VELOCITY RATIOS. AT LOWER FORWARD SPEEDS, THERE WAS A TENDENCY TO FLAP, RATHER LIKE A HOSE END WHEN FREED. IT IS ANTICIPATED THAT, IF VISCOUS EFFECTS WERE SIMULATED, THESE MOTIONS MIGHT DAMP OUT. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /20M07

AD-718 122 20/4 1/1 1/3
NORTHROP CORP HAWTHORNE CALIF. AIRCRAFT DIV

A WIND TUNNEL INVESTIGATION OF JETS EXHAUSTING INTO A CROSSFLOW. VOLUME I. TEST DESCRIPTION AND DATA ANALYSIS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
DEC 70 448P FRICKE,LYNN B. ;WOOLER, PETER T. ;ZIEGLER,HENRY ;
CONTRACT: F33615-69-C-1602
PROJ: AF-698BT
TASK: 698BT01
MONITOR: AFFDL TR-70-154-VOL-1

UNCLASSIFIED REPORT

DESCRIPTORS: (*JET MIXING FLOW, INTERFERENCE), (*EXHAUST GASES, JET MIXING FLOW), (*VERTICAL TAKE-OFF PLANES, NOZZLE GAS FLOW), FLAT PLATE MODELS, WIND TUNNEL MODELS, FLOW FIELDS, CURVE FITTING, PRESSURE, DATA PROCESSING SYSTEMS, TEST METHODS, FLOW VISUALIZATION, INTERACTIONS, SIDESLIP (U)
IDENTIFIERS: TOTAL PRESSURE RAKES, *CROSS FLOW, GRAPHS(CHARTS), STATIC PRESSURE DISTRIBUTIONS, CIRCULAR PLATES (U)

A LOW SPEED WIND TUNNEL TEST OF A FOUR-FOOT DIAMETER CIRCULAR PLATE MODEL WITH UP TO THREE EXHAUSTING JETS WAS CONDUCTED TO DETERMINE SURFACE STATIC PRESSURE DISTRIBUTIONS, JET PATHS, AND JET DECAY CHARACTERISTICS IN THE PRESENCE OF A CROSSFLOW. DATA WERE OBTAINED FOR THE ONE-JET CONFIGURATION WITH THE JET EXITING AT A NUMBER OF ANGLES TO THE PLATE AND AT VARIOUS VELOCITY RATIOS AND SIDESLIP ANGLES. TWO-JET ARRANGEMENTS WERE TESTED WITH THE JETS EXITING NORMAL TO THE PLATE FOR THREE DIFFERENT SPACINGS BETWEEN THE TWO JETS AND AT A NUMBER OF VELOCITY RATIOS AND SIDESLIP ANGLES. THREE-JET CONFIGURATION DATA WERE OBTAINED WITH THE JETS EXITING NORMAL TO THE PLATE FOR A NUMBER OF VELOCITY RATIOS AND SIDESLIP ANGLES. AS A RESULT OF THIS INVESTIGATION, SEVERAL CONCLUSIONS ARE DEDUCED PERTAINING TO THE INTERACTION OF MULTIPLE JETS EXHAUSTING INTO A CROSSFLOW. THE TEST MODEL, INSTRUMENTATION, TEST PROCEDURE, AND REDUCTION AND ACCURACY OF THE TEST DATA ARE DISCUSSED IN THIS VOLUME. A SUMMARY AND DISCUSSION OF THE TEST RESULTS ARE ALSO PRESENTED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-718 123 20/4 1/1 1/3
NORTHROP CORP HAWTHORNE CALIF AIRCRAFT DIV

A WIND TUNNEL INVESTIGATION OF JETS EXHAUSTING INTO A CROSSFLOW. VOLUME IV. ADDITIONAL DATA FOR THE THREE-JET CONFIGURATION. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
DEC 70 200P FRICKE,LYNN B. ;WOOLER, PETER T. ;ZIEGLER,HENRY ;
CONTRACT: F33615-69-C-1602
PROJ: AF-6988T
TASK: 6988T01
MONITOR: AFFDL TR-70-154-VOL-4

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 1, AD-718 122. REPORT ON V/STOL AIRCRAFT AERODYNAMIC PREDICTION METHODS INVESTIGATION.

DESCRIPTORS: (*JET MIXING FLOW, INTERFERENCE), (*EXHAUST GASES, JET MIXING FLOW), (*VERTICAL TAKE-OFF PLANES, NOZZLE GAS FLOW), FLAT PLATE MODELS, WIND TUNNEL MODELS, INTERACTIONS, FLOW FIELDS, CURVE FITTING, PRESSURE, VELOCITY, SIDESLIP (U)
IDENTIFIERS: *CROSS FLOW, THREE JET CONFIGURATIONS, GRAPHS(CHARTS), CIRCULAR PLATES, STATIC PRESSURE DISTRIBUTIONS (U)

A LOW SPEED WIND TUNNEL TEST OF A FOUR-FOOT DIAMETER CIRCULAR PLATE MODEL WITH UP TO THREE EXHAUSTING JETS WAS CONDUCTED TO DETERMINE SURFACE STATIC PRESSURE DISTRIBUTIONS, JET PATHS, AND JET DECAY CHARACTERISTICS IN THE PRESENCE OF A CROSSFLOW. THREE-JET CONFIGURATION DATA WERE OBTAINED WITH THE JETS EXITING NORMAL TO THE PLATE FOR A NUMBER OF VELOCITY RATIOS AND SIDESLIP ANGLES. AS A RESULT OF THIS INVESTIGATION, SEVERAL CONCLUSIONS ARE DEDUCED PERTAINING TO THE INTERACTION OF MULTIPLE JETS EXHAUSTING INTO A CROSSFLOW. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-720 232 20/4 1/1
NORTHROP CORP HAWTHORNE CALIF AIRCRAFT DIV

A WIND TUNNEL INVESTIGATION OF JETS EXHAUSTING INTO A CROSSFLOW. VOLUME II. ADDITIONAL DATA FOR THE ONE-JET CONFIGURATION. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT., DEC 70 506P FRICKE,LYNN B. ;WOOLER, PETER T. ;ZIEGLER,HENRY ;
CONTRACT: F33615-69-C-1602
PROJ: AF-698BT
TASK: 698BT01
MONITOR: AFFDL TR-70-154-VOL-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 1, AD-718 122 AND VOLUME 3, AD-720 233.

DESCRIPTORS: (*JET MIXING FLOW, INTERFERENCE), (*VERTICAL TAKE-OFF PLANES, NOZZLE GAS FLOW), DATA, FLAT PLATE MODELS, WIND TUNNEL MODELS, FLOW FIELDS, PRESSURE, SIDESLIP, VELOCITY (U)
IDENTIFIERS: JET DECAY, STATIC PRESSURE DISTRIBUTION, *VELOCITY RATIOS, *ONE JET CONFIGURATIONS, GRAPHS(CHARTS), *CROSS FLOW (U)

A LOW SPEED WIND TUNNEL TEST OF A FOUR-FOOT DIAMETER CIRCULAR PLATE MODEL WAS CONDUCTED TO DETERMINE SURFACE STATIC PRESSURE DISTRIBUTIONS; JET PATHS, AND JET DECAY CHARACTERISTICS IN THE PRESENCE OF A CROSSFLOW. DATA WERE OBTAINED FOR A ONE-JET CONFIGURATION WITH THE JET EXITING AT A NUMBER OF ANGLES TO THE PLATE AND AT VARIOUS VELOCITY RATIOS AND SIDESLIP ANGLES. THE REPORT IS THE SECOND OF FOUR VOLUMES. THE TEST MODEL, INSTRUMENTATION, TEST PROCEDURE, AND REDUCTION AND ACCURACY OF THE TEST DATA WERE DISCUSSED IN VOLUME 1. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-720 233 20/4 1/1
NORTHROP CORP HAWTHORNE CALIF AIRCRAFT DIV

A WIND TUNNEL INVESTIGATION OF JETS EXHAUSTING INTO A CROSSFLOW. VOLUME III. ADDITIONAL DATA FOR TWO-JET CONFIGURATIONS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT., DEC 70 503P FRICKE,LYNN B. ;WOOLER, PETER T. ;ZIEGLER,HENRY ;
CONTRACT: F33615-69-C-1602
PROJ: AF-6988T
TASK: 6988T01
MONITOR: AFFDL TR-70-154-VOL-3

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 2, AD-720 232.

DESCRIPTORS: (*JET MIXING FLOW, INTERFERENCE), (*VERTICAL TAKE-OFF PLANES, NOZZLE GAS FLOW), FLAT PLATE MODELS, MODEL TESTS, WIND TUNNEL MODELS, FLOW FIELDS, VELOCITY, DATA, PRESSURE (U)
IDENTIFIERS: JET DECAY, *TWO JET CONFIGURATIONS, STATIC PRESSURE DISTRIBUTION, *VELOCITY RATIOS, GRAPHS(CHARTS), *CROSSFLOW (U)

A LOW SPEED WIND TUNNEL TEST OF A FOUR-FOOT DIAMETER CIRCULAR PLATE MODEL WITH UP TO THREE EXHAUSTING JETS WAS CONDUCTED TO DETERMINE SURFACE STATIC PRESSURE DISTRIBUTIONS, JET PATHS, AND JET DECAY CHARACTERISTICS IN THE PRESENCE OF A CROSSFLOW. TWO-JET ARRANGEMENTS WERE TESTED WITH THE JETS EXITING NORMAL TO THE PLATE FOR THREE DIFFERENT SPACINGS BETWEEN THE TWO JETS AND AT A NUMBER OF VELOCITY RATIOS AND SIDESLIP ANGLES. THREE-JET CONFIGURATION DATA WERE OBTAINED WITH THE JETS EXITING NORMAL TO THE PLATE FOR A NUMBER OF VELOCITY RATIOS AND SIDESLIP ANGLES. AS A RESULT OF THIS INVESTIGATION, SEVERAL CONCLUSIONS ARE DEDUCED PERTAINING TO THE INTERACTION OF MULTIPLE JETS EXHAUSTING INTO A CROSSFLOW. THE REPORT IS THE THIRD OF FOUR VOLUMES. THE TEST MODEL, INSTRUMENTATION, TEST PROCEDURE, AND REDUCTION AND ACCURACY OF THE TEST DATA WERE DISCUSSED IN VOLUME 1. THE PRESENT VOLUME CONTAINS ADDITIONAL DATA PERTAINING TO THE TWO-JET CONFIGURATIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-721 166 1/3 1/2
CIVIL AERONAUTICS BOARD WASHINGTON D C.

CIVIL AERONAUTICS BOARD PLANNING STUDY:
STOL-VTOL AIR TRANSPORTATION SYSTEMS. (U)

MAR 70 37P HINTZE,CARL , JR;

UNCLASSIFIED REPORT

DESCRIPTORS: (*SHORT TAKE-OFF PLANES, AIR TRANSPORTATION), (*VERTICAL TAKE-OFF PLANES, AIR TRANSPORTATION), (*AIR TRANSPORTATION, *CIVIL AVIATION), (*URBAN PLANNING, AIR TRANSPORTATION), DESIGN, ECONOMICS, SOCIOLOGY (U)

THE STUDY WAS PREPARED TO PROVIDE INFORMATION TO THE CIVIL AERONAUTICS BOARD MEMBERS AND STAFF ON THE CURRENT STATUS OF STOL AND VTOL AIRCRAFT, TERMINALS, AND ALLIED FACILITIES. THE STUDY IS A CONSOLIDATION OF AVAILABLE INFORMATION ARRANGED TO INDICATE THE CONSENSUS OF OPINION OF THE VARIOUS AUTHORITIES IN THE FIELD. THE MAJOR DESIGN CONCEPTS OF STOL AND VTOL AIRCRAFT AND SUPPORT SYSTEMS ARE DESCRIBED IN RELATIVELY NON-TECHNICAL TERMS. INCLUDED IS A BRIEF DESCRIPTION OF THE CHANGING SOCIO-ECONOMIC ASPECTS OF THE MAJOR METROPOLITAN AREAS OF THE NATION AND THEIR ANTICIPATED EFFECTS ON URBAN TRANSPORTATION REQUIREMENTS. THE STUDY SUMMARIZES THE PROBABLE COURSE OF EVENTS IN THE EVOLUTION OF STOL AND VTOL AIR TRANSPORTATION SYSTEMS, AND FUTURE PROJECTIONS. (AUTHOR) (U)

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-724 144 1/3
AIR FORCE FLIGHT DYNAMICS LAB WRIGHT-PATTERSON AFB OHIO

THE 'PAPER-PILOT' -- A DIGITAL COMPUTER PROGRAM TO PREDICT PILOT RATING FOR THE HOVER TASK. (U)

MAR 71 99P DILLOW,JAMES D. ;
REPT. NO. AFFDL-TR-70-40
PROJ: AF-8219
TASK: 821909

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *HOVERING), MATHEMATICAL PREDICTION, COMPUTER PROGRAMS, PILOTS, EQUATIONS OF MOTION, GUSTS, COSTS, DIGITAL COMPUTERS (U)

A MATHEMATICAL MODEL FOR PREDICTING THE PILOT RATING OF THE FLYING QUALITIES OF A VTOL AIRCRAFT IN THE PRECISION HOVER MODE IS DESCRIBED. THE MODEL INCLUDES THE FOLLOWING ELEMENTS: THE LONGITUDINAL EQUATIONS OF MOTION FOR THE VTOL AIRCRAFT IN HOVER; A STOCHASTIC GUST MODEL WHICH DESCRIBES DISTURBANCES TO THE AIRCRAFT; A FIXED FORM PILOT MODEL WHICH HAS FOUR FREE PARAMETERS; AND A COST FUNCTIONAL WHICH IS MADE UP OF MEASURES OF AIRCRAFT PERFORMANCE AND PILOT WORKLOAD. THE FOUR FREE PILOT PARAMETERS OF THE PILOT MODEL ARE SELECTED TO MINIMIZE THE COST FUNCTIONAL. THESE PARAMETERS ARE ADJUSTED TO ENSURE A 20% STABILITY MARGIN IN PILOT GAINS AND THEN USED TO COMPUTE A 'PAPER PILOT' RATING OF THE FLYING QUALITIES OF THE VTOL AIRCRAFT IN THE PRECISION HOVER MODE. THE MATHEMATICAL EQUATIONS AND DIGITAL COMPUTER PROGRAM USED TO EXERCISE THE MODEL ARE DESCRIBED. THE 'PAPER PILOT' RATING WAS COMPUTED FOR 79 AIRCRAFT CONFIGURATION/GUST INTENSITY COMBINATIONS. THE AIRCRAFT CONFIGURATIONS CONSIDERED INCLUDE CASES WITH CONTROL LAG, STABILITY AUGMENTATION SYSTEM LAG, AND LIMITED PITCH RATE AUTHORITY IN THE STABILITY AUGMENTATION SYSTEM. THE 'PAPER PILOT' RATINGS ARE COMPARED TO ACTUAL PILOT RATINGS OBTAINED IN FIXED BASE SIMULATION. THE DIFFERENCE BETWEEN THE ACTUAL PILOT RATINGS AND THE 'PAPER PILOT' RATING HAS A MEAN OF .14 AND A STANDARD DEVIATION OF .63 OUT OF A 10 POINT RATING SCALE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-725 241 1/3 1/1
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT E V BRUNSWICK (WEST GERMANY)

UNTERSUCHUNGEN UEBER DEN EINFLUSS EINES GENEIGTEN TRIEBWERKSTRAHLS AUF DIE AERODYNAMISCHEN EIGENSCHAFTEN EINES LEITWERKS (INVESTIGATIONS OF THE INFLUENCE OF AN INCLINE PROPULSIVE JET ON THE AERODYNAMIC PROPERTIES OF THE TAIL ASSEMBLY), (U)

APR 70 18P SEIDEL,MANFRED ;
REPT. NO. DFVLR-SONDERDRUCK-104

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN ZEITSCHRIFT FUER FLUGWISSENSCHAFTEN, V19 N1 P13-29 1971. NO COPIES FURNISHED BY DDC OR NTIS.
SUPPLEMENTARY NOTE: TEXT IN GERMAN.

DESCRIPTORS: (*STABILIZERS(HORIZONTAL TAIL SURFACE), AERODYNAMIC CHARACTERISTICS), LIFT, JETS, PITCH(MOTION), VERTICAL TAKE-OFF PLANES, MODEL TESTS, WEST GERMANY (U)

IN A BASIC EXPERIMENTAL STUDY THE CHANGE IN LIFT OF AN 'ISOLATED' TAILPLANE INDUCED BY A COLD CIRCULAR JET IS DETERMINED. WITH REGARD TO THE LONGITUDINAL STABILITY OF A VTOL AIRCRAFT IN THE TRANSITION SPEED RANGE, A DOMINANT PARAMETER IS THE ANGLE OF THE JET NOZZLE RELATIVE TO THE MAINSTREAM DIRECTION. AS FURTHER PARAMETERS THE JET-SPEED TO MAINSTREAM-SPEED RATIO, THE DIAMETER OF THE NOZZLE AND ITS POSITION RELATIVE TO THE TAILPLANE, THE INCIDENCE, THE CHORD AND THE THICKNESS OF THE TAILPLANE ARE INVESTIGATED. SYSTEMATIC FORCE AND PRESSURE MEASUREMENTS WERE CARRIED OUT ON SEVERAL TAILPLANE MODELS (NACA 0010 SECTION AND FLAT PLATE WITH A ROUNDED NOSE) OF RECTANGULAR PLANFORMS AND WITH SIDEPLATES. THE RESULTS PROVIDE A SURVEY ON THE MAGNITUDE OF JET-INDUCED TAILPLANE CONTRIBUTIONS TO CHANGES IN STABILITY AND MAY ALLOW TO ESTIMATE ROUGHLY ENGINE-EFFLUX EFFECTS IN AN EARLY DESIGN STAGE OF AN AIRCRAFT. SOME FLUID-MECHANICAL ASPECTS OF THE SPREADING AND INTERFERENCE OF INCLINED JETS ARE DISCUSSED. THE TESTING INSTALLATION AND PERFORMANCE ARE BRIEFLY DESCRIBED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-725 746 1/3
CORNELL AERONAUTICAL LAB INC BUFFALO N Y

THE GENERATION OF A MILITARY SPECIFICATION FOR FLYING QUALITIES OF PILOTED V/STOL AIRCRAFT-MIL-F-83300. (U)

DESCRIPTIVE NOTE: FINAL REPT. APR 66-MAR 71, APR 71 41P KEY,DAVID L. ;
REPT. NO. CAL-BB-2925-F-1
CONTRACT: AF 33(615)-3736, F33615-70-C-1322
PROJ: AF-698DC
MONITOR: AFFDL TR-71-23

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, SPECIFICATIONS), (*SHORT TAKE-OFF PLANES, SPECIFICATIONS), PERFORMANCE(ENGINEERING), FLIGHT CONTROL SYSTEMS, STABILITY (U)

THE DOCUMENT DESCRIBES A FOUR YEAR EFFORT WHICH LED TO THE ADOPTION OF A NEW MILITARY SPECIFICATION MIL-F-83300, 'FLYING QUALITIES OF PILOTED V/STOL AIRCRAFT', AND THE PUBLICATION OF A SUPPORTING DOCUMENT, 'BACKGROUND INFORMATION AND USER GUIDE FOR MIL-F-83300, MILITARY SPECIFICATION - FLYING QUALITIES OF PILOTED V/STOL AIRCRAFT' (AFFDL-TR-70-88). INCLUDED IN THE REPORT IS AN ASSESSMENT OF THE STATUS OF V/STOL FLYING QUALITIES RESEARCH AND RECOMMENDATIONS FOR FUTURE WORK. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-726 103 1/3 20/4
NORTH AMERICAN ROCKWELL CORP LOS ANGELES CALIF LOS ANGELES DIV

AERODYNAMIC STABILITY AND CONTROL/WIND TUNNEL DATA CORRELATION. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 15 OCT 66-31 AUG 70,
MAY 71 219P CASTLEL,G. R. ;
REPT. NO. NA-70-327-2
CONTRACT: AF 33(615)-5323
PROJ: AF-698BT
MONITOR: AFFDL TR-71-3

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, STABILITY), (*FLIGHT CONTROL SYSTEMS, VERTICAL TAKE-OFF PLANES), WIND TUNNEL MODELS, HOVERING, POWER, INTERFERENCE, AERODYNAMIC CHARACTERISTICS, EXPERIMENTAL DATA (U)
IDENTIFIERS: V-4 AIRCRAFT, XV-4B AIRCRAFT, XV-5A AIRCRAFT, V-5 AIRCRAFT, V-6 AIRCRAFT, KESTREL AIRCRAFT (U)

THE GENERAL OBJECTIVE WAS TO COLLECT AND ANALYZE AERODYNAMIC STABILITY AND CONTROL DATA FOR THE XV-4B, XV-5A, AND P-1127 VTOL CONFIGURATIONS. CORRELATION AND ANALYSIS OF EXISTING MODEL DATA WERE MADE TO INVESTIGATE HOVER AND TRANSITION CHARACTERISTICS. PARTICULAR EMPHASIS WAS PLACED ON THE AERODYNAMIC POWER EFFECTS, SOMETIMES REFERRED TO AS INTERFERENCE EFFECTS. OTHER AREAS OF INVESTIGATION WERE SOMETIMES REFERRED TO AS INTERFERENCE EFFECTS. OTHER AREAS OF INVESTIGATION WERE NONDIMENSIONAL COEFFICIENTS USED TO PRESENT VTOL DATA AND WIND TUNNEL TEST TECHNIQUES. WIND TUNNEL TESTS WERE CONDUCTED USING AN INLET ONLY MODEL AND A JET ONLY MODEL TO INVESTIGATE SPECIAL TEST AND ANALYSIS PROBLEMS FOR THESE COMPONENTS. THE AGREEMENT BETWEEN DIFFERENT SETS OF XV-4B MODEL DATA WAS, IN GENERAL, FOUND TO BE POOR. HOWEVER, THE NONDIMENSIONAL COEFFICIENTS USED BY LOCKHEED TO REDUCE TO XV-4B MODEL DATA APPEAR TO BE VALID PARAMETERS FOR THIS CATEGORY OF VTOL AIRPLANE. THE JET ENTRAINMENT FLOW WAS SHOWN BY EXPERIMENT TO BE THE PRIMARY CAUSE OF THE XV-4B POWER EFFECTS, AND THE XV-4B JET PATH WAS EXPERIMENTALLY AND THEORETICALLY DETERMINED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-726 572 1/3
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

PRINCIPLES OF DESIGN OF VERTICAL TAKEOFF AND LANDING AIRCRAFT. (U)

FEB 71 45UP KUROCHKIN,F. P. ;
REPT. NO. FTD-MT-24-255-70
PROJ: AF-5362
TASK: DIA-T65-09-04

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF MONO. OSNOVY PROEKTIROVANIYA SAMOLETOV S VERTIKALNYM VZLETOM I POSADKOI, MOSCOW, 1970 PL-352, BY LEE D. THOMPSON.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, DESIGN), AIRPLANE NOISE, MATHEMATICAL ANALYSIS, WEIGHT, HOVERING, AIRCRAFT ENGINES, LANDING GEAR, USSR (U)
IDENTIFIERS: TRANSLATIONS (U)

THE BOOK IS DEDICATED TO THE DRAFT DESIGNING OF A COMPARATIVELY NEW TYPE OF AIRCRAFT POSSESSING THE TAKEOFF AND LANDING PROPERTIES OF HELICOPTERS AND OTHER FLIGHT CHARACTERISTICS, PECULIAR TO AIRCRAFT. THE CHARACTERISTICS OF THEIR AERODYNAMIC CONFIGUATIONS BASIC PARAMETERS, GRAVIMETRIC CHARACTERISTICS, AND DESIGNS WITH VARIOUS POWER PLANT COMPOSITIONS ARE EXAMINED. TURBOPROP (TP) AND TURBOJET ENGINES (TJ) (ORDINARY AND SPECIAL) WERE USED IN THE COMPOSITION OF THE LATTER BOTH AS SUSTAINER AND HOISTING, AND AS COMPOSITE ENGINES ACCOMPLISHING IN ONE UNIT THE ROLE OF THE FIRST AND THE SECOND. METHODS ARE GIVEN FOR CALCULATING THE SPECIFIC VERTICAL TAKEOFF AND LANGING AIRCRAFT (VTOL) PROCESSES OF FLIGHT, FOR EXAMPLE THE TRANSFER FROM VERTICAL FLIGHT TO HORIZONTAL FLIGHT AND CONVERSELY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-728 112 12/1 1/3
SOUTHERN METHODIST UNIV DALLAS TEX INFORMATION AND CONTROL SCIENCES CENTER

OPTIMAL AND SUBOPTIMAL CONTROL SYNTHESIS FOR MINIMUM TIME VTOL TRANSITION. (U)

JUN 70 16P NARDIZZI,LOUIS R. ;TARNG, MING Y. ;PARKER,ROBERT J. ;
CONTRACT: F44620-68-C-0023, NSF-GK-5608
PROJ: AF-9559
MONITOR: AFOSR TR-71-2211

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN IEEE TRANSACTIONS ON AEROSPACE AND ELECTRONIC SYSTEMS VAES-7 N3 P506-520 MAY 71.
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH LTV AEROSPACE CORP., DALLAS, TEX.

DESCRIPTORS: (*ADAPTIVE CONTROL SYSTEMS, MATHEMATICAL MODELS), (*VERTICAL TAKE-OFF PLANES, ADAPTIVE CONTROL SYSTEMS), PARTIAL DIFFERENTIAL EQUATIONS, INTEGRALS, MATRIX ALGEBRA, FLIGHT CONTROL SYSTEMS, NUMERICAL ANALYSIS, FEEDBACK, OPTIMIZATION (U)
IDENTIFIERS: *CONTROL THEORY, AUTOMATIC CONTROL, FEEDBACK CONTROL (U)

OPTIMAL OPEN-LOOP AND SUBOPTIMAL CLOSED-LOOP CONTROLS FOR VTOL AIRCRAFT IN A MINIMUM, CLIMB-TO-CRUISE TIME TRANSITION ARE PRESENTED IN THIS PAPER. THE OPTIMAL OPEN-LOOP CONTROLS ARE SYNTHESIZED BY A PROPOSED GRADIENT TECHNIQUE WHICH PROVIDES FOR THE SELECTION OF DESIRED CHANGES IN PHYSICALLY MEANINGFUL PARAMETERS DURING EACH ITERATION STEP. THE SUBOPTIMAL CLOSED-LOOP CONTROLS OVER THE MINIMUM TIME-TO-CLIMB INTERVAL, PIECEWISE-CONSTANT FEEDBACK GAINS AND SWITCHING TIMES ARE SYNTHESIZED FOR MULTIDIMENSIONAL CONTROL VECTORS WHICH ARE LINEAR COMBINATIONS OF OBSERVABLE STATES. SEVERAL COMPUTATIONAL RESULTS ARE PRESENTED FOR OPTIMAL AND SUBOPTIMAL MINIMUM TIME CONTROLS WITH CONSTRAINED AND UNCONSTRAINED TERMINAL FLIGHT-PATH ANGLES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-728 546 1/3 20/4
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

LOW AREA RATIO THRUST AUGMENTING EJECTORS, (U)

71 11P FANCHER,RICHARD B. ;
REPT. NO. ARL-71-0113
PROJ: AF-7116
TASK: 711600

UNCLASSIFIED REPORT
AVAILABILITY: PAPER COPY AVAILABLE FROM AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1290 AVE. OF THE AMERICAS, NEW YORK, N. Y. 10019 $2.00/MF$1.00. NO COPIES FURNISHED BY DDC OR NTIS.
SUPPLEMENTARY NOTE: PUB. IN AIAA FLUID AND PLASMA DYNAMICS CONFERENCE (4TH) HELD AT PALO ALTO, CALIF. 21-23 JUN 71, AS PAPER 71-576.

DESCRIPTORS: (*SUBSONIC NOZZLES, *THRUST AUGMENTATION), (*VERTICAL TAKE-OFF PLANES, LIFT), SHORT TAKE-OFF PLANES, SECONDARY FLOW, VELOCITY, STATISTICAL DISTRIBUTIONS, MATHEMATICAL MODELS, NOZZLES (U)
IDENTIFIERS: *THRUST AUGMENTING EJECTORS, ENTRAINMENT, VELOCITY PROFILES (U)

THE THRUST AUGMENTATION, LIFT AUGMENTATION AND NOISE REDUCTION CHARACTERISTICS OF COMPACT EJECTORS MAKE THEM POTENTIALLY ATTRACTIVE FOR PROPULSION LIFT SYSTEMS, ALTHOUGH IN THE PAST POOR THRUST AUGMENTATION RESULTS HAVE NEGATED THE OTHER BENEFITS. A SYNTHESIS OF AN EJECTOR'S INTERNAL FLOW PHENOMENA DEVELOPED IN THIS PAPER INDICATES THAT IMPROVED MIXING AND DIFFUSION CAN SIGNIFICANTLY INCREASE THRUST AUGMENTATION. A COMPANION EJECTOR EXPERIMENT DESIGNED FOR RAPID MIXING CONFIRMS THE MODEL'S AUGMENTATION PREDICTIONS AND SHOWS REASONABLE AGREEMENT WITH OTHER FLOW CHARACTERISTICS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-728 965 20/4 1/1
AIR VEHICLE CORP SAN DIEGO CALIF

A SLANTED ROUND JET AT LOW FORWARD SPEED, (U)

DEC 70 5P STRAND,T. ;
CONTRACT: DA-31-124-ARO(D)-311
PROJ: DA-2-0-061102-B-33-G
MONITOR: AROD 5274;7-E

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF AIRCRAFT, V8 N4 P278-279 APR 71.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 29 JAN 70.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *JET MIXING FLOW), FLOW FIELDS, THEORY, WIND TUNNEL MODELS, MODEL TESTS, ANGLE OF ATTACK, VORTICES, ANALYSIS OF VARIANCE, VERTICAL TAKE-OFF PLANES (U)
IDENTIFIERS: *SLANTED ROUND JETS (U)

A NEW THEORY WHICH MAY BE USED FOR ESTIMATES OF THE VARIATION OF THE LIFT OF A SLANTED ROUND JET WITH FORWARD SPEED IS EVALUATED. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-730 121 1/3 20/4
CORNELL AERONAUTICAL LAB INC BUFFALO N Y

DEVELOPMENT OF ADVANCED TECHNIQUES FOR THE IDENTIFICATION OF V/STOL AIRCRAFT STABILITY AND CONTROL PARAMETERS. (U)

DESCRIPTIVE NOTE: FINAL REPT. MAY 69-DEC 70,
AUG 71 359P CHEN,ROBERT T. N. ;
EULRICH,BERNARD J. ;LEBACQZ,J. VICTOR ;
REPT. NO. CAL-BM-2820-F-1
CONTRACT: N00019-69-C-0534

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, AERODYNAMIC CHARACTERISTICS), (*SHORT TAKE-OFF PLANES, MATHEMATICAL MODELS), FLIGHT CONTROL SYSTEMS, EQUATIONS OF MOTION, FLIGHT PATHS, STABILITY, HOVERING, ALGORITHMS (U)
IDENTIFIERS: *TRANSITION FLIGHT, KALMAN FILTERS, X-22 AIRCRAFT (U)

CONTEMPORARY ANALYSES OF TRANSITION FLIGHT OF V/STOL AIRCRAFT ARE BASED ON AERODYNAMIC DATA MEASURED IN A WIND TUNNEL OR ON ANALYTICAL PREDICTION USING METHODS DEVELOPED FOR CONVENTIONAL AIRCRAFT. THE VALIDITY AND ACCURACY OF THESE TECHNIQUES FOR V/STOL AIRCRAFT HAS NOT YET BEEN ESTABLISHED, AND IT IS ESSENTIAL THAT THEY BE CORRELATED WITH FLIGHT TEST DATA THROUGH PARAMETER IDENTIFICATION. IN SPITE OF THE COMPLICATED NATURE OF V/STOL DYNAMICS IN TRANSITION, SOME METHOD OF IDENTIFYING THESE CHARACTERISTICS IS REQUIRED. THIS REPORT DOCUMENTS THE DEVELOPMENT OF IDENTIFICATION TECHNIQUES TO MEET THIS REQUIREMENT. THE REPORT FIRST PRESENTS THE SELECTION OF A MATHEMATICAL MODEL TO REPRESENT A V/STOL AIRCRAFT (THE X-22A). THIS IS FOLLOWED BY A DISCUSSION OF AVAILABLE IDENTIFICATION TECHNIQUES. BASED UPON A THOROUGH KNOWLEDGE OF THE REQUIREMENTS OF THIS PROGRAM AND THE LIMITATIONS OF THE AVAILABLE TECHNIQUES, ADVANCED TECHNIQUES SUITABLE FOR IDENTIFICATION OF V/STOL AIRCRAFT STABILITY AND CONTROL PARAMETERS ARE DEVELOPED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-732 736 20/4 1/3
GEORGIA INST OF TECH ATLANTA

VORTEX SHEDDING FROM A TURBULENT JET IN A CROSS-WIND. (U)

FEB 71 15P MCMAHON,H. M. ;HESTER,D. D. ;PALFERY,J. G. ;
CONTRACT: DAHC04-68-C-0004
MONITOR: AROD T-2;18-E

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF FLUID MECHANICS, V48 PT1 P73-80 1971.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 20 AUG 70.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *JET MIXING FLOW), WAKE, TURBULENCE, BLUNT BODIES, NOZZLE GAS FLOW, FLAT PLATE MODELS, MODEL TESTS (U)
IDENTIFIERS: *VORTEX SHEDDING, EXHAUST PLUMES, *CROSS WIND PROPERTIES, STROUHAL NUMBER (U)

MEASUREMENTS IN THE WAKE BEHIND TURBULENT JETS EXHAUSTING FROM A SOLID SURFACE INTO A CROSS-WIND INDICATE THAT VORTEX SHEDDING OCCURS AS IN THE CASE OF FLOW PAST SOLID BLUFF BODIES. THE STROUHAL NUMBERS FOR FLOW PAST A CIRCULAR AND A BLUNT JET ARE IN QUALITATIVE AGREEMENT WITH THOSE FOR CORRESPONDING SOLID BODIES, PROVIDED THAT THE WIDTH OF THE SPREADING JET SOME DISTANCE FROM THE SURFACE IS USED RATHER THAN THE JET EXIT PLANE DIMENSION. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-732 841 20/4 1/3
ARNOLD ENGINEERING DEVELOPMENT CENTER ARNOLD AIR FORCE STATION TENN

FLOW FIELD MEASUREMENTS OF A JET IN CROSSFLOW WITH A LASER VELOCIMETER. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
NOV 71 31P BINION,T. W. , JR;
REPT. NO. AEDC-TR-71-192
CONTRACT: F40600-72-C-0003
PROJ: AF-8219, ARO-P-D0141
TASK: 821907

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH ARO, INC., TULLAHOMA, TENN., REPT. NO. ARO-PWT-TR-71-159.

DESCRIPTORS: (*NOZZLE GAS FLOW, VELOCITY), (*VERTICAL TAKE-OFF PLANES, JET MIXING FLOW), LASERS, WIND TUNNEL MODELS, FLAT PLATE MODELS, JETS, INSTRUMENTATION, SUBSONIC CHARACTERISTICS, FLOW VISUALIZATION (U)
IDENTIFIERS: CROSS FLOW, LASER VELOCIMETERS (U)

TESTS WERE CONDUCTED IN A LOW SPEED WIND TUNNEL (V/STOL) TO MEASURE THE VELOCITY FIELD OF A JET ISSUING FROM A FLAT PLATE WITH CROSSFLOW. VELOCITY COMPONENTS WERE MEASURED WITH A DUAL-SCATTER LASER VELOCIMETER AT EFFECTIVE VELOCITY RATIOS OF 0.125 AND 0.250. THE DATA YIELDED VELOCITY VECTORS ALONG LINES NORMAL TO THE JET CENTERLINE IN THREE PLANES PARALLEL TO THE PLANE OF SYMMETRY. INDICATIONS OF THE FLOW FIELD TURBULENCE WERE ALSO MEASURED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-733 987 1/3 o/7
NAVAL AIR DEVELOPMENT CENTER WARMINSTER PA AERO MECHANICS DEPT

AN EVALUATION OF SEARCH AND RESCUE MISSION CHARACTERISTICS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
NOV 71 63P BRENNAN,THOMAS J. ;
REPT. NO. NADC-AM-7136
PROJ: A330-3300/202-C/2W45660000

UNCLASSIFIED REPORT

DESCRIPTORS: (*RESCUES, VERTICAL TAKE-OFF PLANES), (*VERTICAL TAKE-OFF PLANES, DESIGN), AIRFRAMES, AIRCRAFT ENGINES, PROPULSION, MISSION PROFILES, HOVERING (U)
IDENTIFIERS: SAR(SEARCH AND RESCUE), SEARCH AND RESCUE (U)

THE REPORT PROVIDES AN OVERVIEW OF THE GENERAL REQUIREMENTS FOR AN AIRBORNE RESCUE SYSTEM TO FULFILL A MILITARY SAR (SEARCH AND RESCUE) MISSION. PROJECTED MISSION AND AIRFRAME/PROPULSION SYSTEM REQUIREMENTS ARE PRESENTED TO PROVIDE A BASELINE FOR INITIAL DEVELOPMENT ANALYSES. A STANDARD METHODOLOGY FOR THE CONDUCT OF DETAILED PERFORMANCE EVALUATION AND OVERALL MISSION ANALYSES ARE PROPOSED TO DEFINE CRITICAL AREAS IN SAR AIRCRAFT DESIGNS. AN AIRCRAFT/PROPULSION SYSTEM IS DESIGNED TO ILLUSTRATE THE APPLICATIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-734 068 1/3
BOEING CO PHILADELPHIA PA VERTOL DIV

CYCLIC PITCH CONTROL ON A V/STOL TILT WING AIRCRAFT. (U)

DESCRIPTIVE NOTE: FINAL REPT. MAR 70-MAY 71,
OCT 71 114P KOLESAR,CHARLES E. ;
REPT. NO. D210-10353-1
CONTRACT: F33615-70-C-1000
PROJ: AF-698BT
MONITOR: AFFDL TR-71-91

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FLIGHT CONTROL SYSTEMS), (*FLIGHT CONTROL SYSTEMS, *PITCH(MOTION)), TILT WINGS, PROPELLERS(AERIAL), PROPELLER BLADES, AERODYNAMIC CONTROL SURFACES, WIND TUNNEL MODELS, HARMONIC ANALYSIS, HOVERING, STABILITY, TRANSPORT PLANES (U)
IDENTIFIERS: CYCLIC PITCH CONTROL, *TRANSITION FLIGHT (U)

THE REPORT PRESENTS THE KEY RESULTS OF A MODEL WING TUNNEL TEST PROGRAM THAT WAS DIRECTED TOWARDS INVESTIGATING THE USE OF CYCLIC PITCH PROPELLERS AS THE LOW SPEED LONGITUDINAL CONTROL SYSTEM OF A FOUR PROPELLER V/STOL TILT WING TRANSPORT-TYPE AIRCRAFT. THE ALMOST LINEAR PITCH CONTROL EFFECTIVENESS OF THIS SYSTEM THROUGH TRANSITIONAL FLIGHT AND IN-GROUND EFFECT ALONG WITH THE CORRELATION WITH THEORY IS DISCUSSED, AND THE MODERATE POWER INCREASE ASSOCIATED WITH ITS USE IS SHOWN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOMO7

AD-734 237 1/3
BOEING CO PHILADELPHIA PA VERTOL DIV

1/3 SCALE V/STOL CYCLIC PITCH PROPELLERS: RESULTS OF WIND TUNNEL TESTS. (U)

DESCRIPTIVE NOTE: CONTRACTOR TEST REPT. NOV-DEC 70., FEB 71 157P WIDMAYER,EDWARD ;TOMASSONI, J. ;
REPT. NO. D170-10040-1
CONTRACT: F33615-70-C-1000
PROJ: AF-6988T
MONITOR: AFFDL TR-71-91-REF-5

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO REPT. NO. D170-10039-1, AD-734 236.

DESCRIPTORS: (*PROPELLERS(AERIAL), *PITCH(MOTION)), WIND TUNNEL MODELS, MODEL TESTS, TILT WINGS, VERTICAL TAKE-OFF PLANES, FLIGHT CONTROL SYSTEMS, EFFECTIVENESS, POWER, PROPELLER BLADES, PROPELLER HUBS, HOVERING, DESIGN (U)
IDENTIFIERS: *CYCLIC PITCH PROPELLERS, TRANSITION FLIGHT (U)

THE REPORT PRESENTS THE RESULTS OF A WIND TUNNEL TEST PERFORMED IN THE BOEING-VERTOL WIND TUNNEL ON A 1/3 SCALE V/STOL 4-BLADED CYCLIC PITCH PROPELLER, HAVING A TOTAL ACTIVITY FACTOR OF 640. THE PROPELLER WAS TESTED AS BOTH AN ISOLATED PROPELLER AND AS AN INSTALLED PROPELLER. THE PRIMARY OBJECTIVES OF THE TEST WERE TO DETERMINE: THE EFFECTIVENESS OF CYCLIC PITCH CONTROL FOR LONGITUDINAL CONTROL DURING HOVER AND TRANSITION, THE CHANGE IN POWER REQUIRED FOR CYCLIC PITCH CONTROL AND BLADE AND HUB LOADS FOR USE IN DESIGN AND FOR VERIFICATION OF ANALYTICAL METHODS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-734 702 1/2 1/3
HONEYWELL INC ST PAUL MINN SYSTEMS AND RESEARCH CENTER

IRF STEEP-ANGLE APPROACH: EFFECTS OF WIND, SYSTEM DATA-RATE, AND CONTINGENCY-EVENT VARIABLES. (U)

DESCRIPTIVE NOTE: FINAL REPT. JUL 70-AUG 71,
DEC 71 262P WOLF,JAMES D. ;BARRETT, MIKE F. ;
REPT. NO. 12571-FR3
CONTRACT: N00014-68-C-0191
PROJ: NR-213-061
MONITOR: JANAIR 711105

UNCLASSIFIED REPORT

DESCRIPTORS: (*INSTRUMENT LANDINGS, *VERTICAL TAKE-OFF PLANES), (*HELICOPTERS, TACTICAL AIR SUPPORT), APPROACH, APPROACH INDICATORS, DISPLAY SYSTEMS, SIMULATION, WIND, MAN-MACHINE SYSTEMS, DATA, GLIDE PATH SYSTEMS (U)
IDENTIFIERS: UH-1 AIRCRAFT, MAN IN THE LOOP CONTROL SYSTEMS, H-1 AIRCRAFT, STEEP ANGLE APPROACHES, STEEP ANGLE LANDINGS (U)

THE PRIMARY OBJECTIVE OF THE STUDY WAS TO INVESTIGATE, BY MEANS OF REAL-TIME MAN-IN-THE-LOOP SIMULATION TECHNIQUES, PILOTING PERFORMANCE AS INFLUENCED BY WIND, SYSTEM DATA-RATE, AND CONTINGENCY-EVENT VARIABLES DURING IFR STEEP APPROACHES WITH VERTICAL-LIFT AIRCRAFT. BY ALSO SIMULTANEOUSLY EVALUATING EFFECTS OF DISPLAY-FORMAT, APPROACH-ANGLE AND MEASUREMENT-NOISE VARIABLES TO THE EXTENT POSSIBLE WITHIN THE SCOPE OF EACH STUDY TASK, AN INCREASED DEGREE OF GENERALITY OF STUDY RESULTS WAS OBTAINED. A VARIABLE-VELOCITY SIMULATION OF THE BELL UH-1 HELICOPTER SERVED AS THE TEST VEHICLE IN ALL STUDY TASKS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-735 420 1/3
NATIONAL AERONAUTICAL ESTABLISHMENT OTTAWA (ONTARIO)

A FLIGHT INVESTIGATION OF LATERAL-DIRECTIONAL HANDLING QUALITIES FOR V/STOL AIRCRAFT IN LOW SPEED MANOEUVRING FLIGHT. (U)

OCT 71 151P DOETSCH,K-H. , JR.;GOULD, D. G. ;MCGREGOR,D. M. ;
REPT. NO. NAE-LR-549
MONITOR: NRC 12285

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH CORNELL AERONAUTICAL LAB., INC., BUFFALO, N. Y.
SUPERSEDES AD-707 631.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, HANDLING), ROLL, MANEUVERABILITY, FLIGHT SIMULATORS, FLIGHT TESTING, FLIGHT SPEEDS, APPROACH
(U)

AN INVESTIGATION TO DETERMINE THE RANGES OF VARIOUS LATERAL-DIRECTIONAL CHARACTERISTICS REQUIRED TO PROVIDE ADEQUATE FLYING QUALITIES FOR TURNING MANOEUVRES AT LOW SPEED WAS UNDERTAKEN USING AN AIRBORNE V/STOL AIRCRAFT SIMULATOR. FIVE PARAMETERS WERE VARIED IN A SYSTEMATIC MANNER: THE DAMPING RATIO, THE FREQUENCY AND THE RATIO OF THE ROLL-ANGLE TO THE SIDESLIP-ANGLE IN THE DUTCH ROLL MODE, TOGETHER WITH THE DAMPING RATIO AND FREQUENCY OF THE NUMERATOR QUADRATIC OF THE ROLL-ANGLE TO AILERON-CONTROL-INPUT TRANSFER FUNCTION. THE PILOTS PERFORMED A LOW SPEED, VISUAL MANOEUVRING TASK AND DOCUMENTED THEIR ASSESSMENT OF THE CHARACTERISTICS THROUGH EXTENSIVE COMMENTS AND A NUMERICAL RATING. (AUTHOR)
(U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOMO/

AD-735 633 1/3
BOEING CO PHILADELPHIA PA VERTOL DIV

WIND TUNNEL TEST OF A POWERED TILT-ROTOR DYNAMIC MODEL ON A SIMULATED FREE FLIGHT SUSPENSION SYSTEM. VOLUME VI. (U)

DESCRIPTIVE NOTE: FINAL REPT. JAN-JUL 71, OCT 71 209P TOMASSONI,JOHN E. ;TAYLOR, ROBERT B. ;DELARM,LEON N. ;SCHAGRIN,EDWARD B. ;
REPT. NO. D213-10000-6
CONTRACT: F33615-69-C-1577
MONITOR: AFFDL TR-71-26-VOL-6

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 4, PART 2, AD-735 733.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, MODEL TESTS), ROTARY WINGS, WIND TUNNEL MODELS, FLIGHT TESTING, FREQUENCY, LOADING(MECHANICS), GROUND EFFECT (U)
IDENTIFIERS: *TILT ROTOR AIRCRAFT (U)

THE REPORT PRESENTS THE RESULTS OF A WIND TUNNEL TEST ON A POWERED DYNAMIC MODEL OF THE BOEING M-160 TILT ROTOR AIRCRAFT WITH 5.5 FOOT DIAMETER ROTORS. THE MODEL WAS TESTED IN THE BOEING V/STOL 20 X 20 FOOT WIND TUNNEL DURING JANUARY-FEBRUARY 1971 AND WAS SUPPORTED TO SIMULATE FREE FLIGHT CONDITIONS WITH MOUNT FREQUENCIES MUCH LOWER THAN THE DYNAMIC AIRCRAFT FREQUENCIES. BLADE LOADS, WING LOADS, FLYING QUALITIES AND SKITTISHNESS IN GROUND EFFECT DATA WERE OBTAINED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-736 247 1/4
HONEYWELL INC ST PAUL MINN SYSTEMS AND RESEARCH CENTER

DISPLAY AND RELATED SYSTEM REQUIREMENTS FOR IFR STEEP-APPROACH. (U)

DESCRIPTIVE NOTE: FINAL REPT. NOV 67-AUG 71, JAN 72 176P WOLF,JAMES D. ;
REPT. NO. 12571-FR4
CONTRACT: N0U014-68-C-0191
PROJ: NR-213-061
MONITOR: JANAIR 711106

UNCLASSIFIED REPORT

DESCRIPTORS: (*DISPLAY SYSTEMS, *INSTRUMENT FLIGHT), (*FLIGHT INSTRUMENTS, *VERTICAL TAKE-OFF PLANES), INSTRUMENT LANDINGS, APPROACH INDICATORS, APPROACH, HELICOPTERS, SIMULATION (U)
IDENTIFIERS: UH-1 AIRCRAFT, XV-5 AIRCRAFT, H-1 AIRCRAFT (U)

THE OBJECTIVE WAS TO ESTABLISH DISPLAY INFORMATION AND SUBSYSTEM REQUIREMENTS FOR MANUALLY CONTROLLED STEEP-ANGLE APPROACH AND LANDING UNDER IFR FLIGHT CONDITIONS WITH VERTICAL-LIFT AIRCRAFT. INVESTIGATIONS WERE CONDUCTED AS A SERIES OF ITERATIVE ANALYSES AND THE REAL-TIME MAN-IN-THE-LOOP SIMULATIONS TO EVALUATE SELECTED DISPLAY FORMATS, THEMSELVES, AS WELL AS THE EFFECTS WHICH RELEVANT SYSTEM AND ENVIRONMENTAL VARIABLES HAVE UPON PILOTING TASK PERFORMANCE. ALTERNATIVE DISPLAY FORMATS WERE INITIALLY TESTED UNDER IDEALIZED FLIGHT CONDITIONS. THE TESTING OF SELECTED FORMATS WAS THEN CONTINUED IN A SERIES OF SIMULATION STUDIES IN WHICH SYSTEM AND ENVIRONMENTAL CHARACTERISTICS WERE SYSTEMATICALLY INTRODUCED TO DETERMINE THEIR INDIVIDUAL AND INTERACTIVE EFFECTS UPON PILOTING PERFORMANCE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-736 537 1/3
NAVAL POSTGRADUATE SCHOOL MONTEREY CALIF

PROGRAMMED PILOTAGE AS A MEANS OF IMPROVING ROTORCRAFT PERFORMANCE IN LEVEL FLIGHT. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
SEP 71 49P WILDMAN,ROBERT ALAN ;

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *FLIGHT CONTROL SYSTEMS), FLIGHT SPEEDS, OPTIMIZATION, FOLDING HELICOPTER ROTORS, HELICOPTERS, TILT WINGS, HOVERING, AIRSPEED (U)
IDENTIFIERS: TRANSITIONAL FLIGHT, DESIGN CRITERIA, *PROGRAMMED PILOTAGE (U)

AIRFRAME DRAG REDUCTION AND ENGINE DUCT DESIGN, WHILE NECESSARY TO THE IMPROVEMENT OF PERFORMANCE, CANNOT ALONE OFFSET THE AERODYNAMIC LIMITATIONS INHERENT IN ROTARY WING FLIGHT. THE LATTER, WHICH HAVE BECOME PREDOMINANT WITH THE ADVENT OF HIGH OUTPUT TURBOSHAFT ENGINES MUST THEN BE OVERCOME BY OTHER MEANS DISCUSSED IN THIS PAPER. PROGRAMMED PILOTAGE TECHNIQUES WHICH UTILIZE REAL-TIME FLIGHT DATA TO VARY AERODYNAMIC PARAMETERS ARE INVESTIGATED AND INCORPORATED IN THE PRELIMINARY DESIGN OF A HIGH-SPEED ROTORCRAFT. THE ROTOR SPEED AND THE CONTRIBUTION OF LIFT FROM A FIXED WING ARE THUS OPTIMIZED THROUGHOUT THE FLIGHT ENVELOPE, THEREBY GREATLY ENHANCING LEVEL FLIGHT SPEED CHARACTERISTICS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-736 825 1/3
BOEING CO PHILADELPHIA PA VERTOL DIV

WIND TUNNEL TEST OF THE AERODYNAMICS AND DYNAMICS OF ROTOR SPINUP, STOPPING AND FOLDING ON A SEMISPAN FOLDING TILT-ROTOR MODEL. VOLUME VII. (U)

DESCRIPTIVE NOTE: FINAL REPT. JAN-JUL 71,
OCT 71 402P VAN WAGENSVELD,DIRK ;MCHUGH, FRANK J. ;DELARM,LEON N. ;LAPINSKI,WALTER L. ;MAGEE,JOHN P. ;
REPT. NO. D213-10000-7
CONTRACT: F33615-69-C-1577
MONITOR: AFFDL TR-71-62-VOL-7

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON DESIGN STUDIES AND MODEL TESTS OF THE STOWED TILT ROTOR CONCEPT. SEE ALSO VOLUME 6, AD-735 633.

DESCRIPTORS: (*ROTARY WINGS, MODEL TESTS), (*VERTICAL TAKE-OFF PLANES, MODEL TESTS), WIND TUNNEL MODELS, SCALE, STRUCTURAL PROPERTIES, AERODYNAMIC CHARACTERISTICS, LOADING(MECHANICS) (U)
IDENTIFIERS: *TILT ROTOR AIRCRAFT (U)

WIND TUNNEL TEST DATA OBTAINED WITH A 1/9-SCALE SEMISPAN, UNPOWERED, DYNAMICALLY-SCALED MODEL 213 STOWED/TILT ROTOR ARE REPORTED. THE OBJECTIVES OF THE TESTS WERE TO OBTAIN AERODYNAMIC, STRUCTURAL, AND DYNAMICS DATA DURING THE SPINUP, FEATHER AND BLADE FOLD CYCLES OF THIS VEHICLE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-602 730 1/3
LING-TEMCO-VOUGHT INC DALLAS TEX LTV VOUGHT AERONAUTICS DIV

XC-142A VTOL TRANSPORT PROGRAM. (U)

DESCRIPTIVE NOTE: MONTHLY PROGRESS REPT. NO. 54 FOR JUN 66.
JUN 66 19P
CONTRACT: AF 33(657)-7868

UNCLASSIFIED REPORT

DESCRIPTORS: (•VERTICAL TAKE-OFF PLANES, •TRANSPORT PLANES), SCHEDULING, RESEARCH PROGRAM ADMINISTRATION, MAINTENANCE, ACCEPTABILITY, PERFORMANCE(ENGINEERING), DESIGN, GROUND SUPPORT EQUIPMENT, SPARE PARTS, TRAINING DEVICES, FLIGHT TESTING (U)
IDENTIFIERS: C-142 AIRCRAFT (U)

CONTENTS: DEVELOPMENT OF XC-142A AND FABRICATION OF FIVE PHOTOTYPE MDELS; FABRICATION OF MOCKUP; GROUND TESTS; ENGINEERING DATA; DESIGN DATA; FLIGHT TEST; REPORTS; SPARE PARTS FOR FIVE PROTOTYPE AIRPLANES; DEVELOPMENT AND FABRICATION OF AGE; SPARE PARTS FOR AGE; TRAINING AND TRAINING EQUIPMENT; AND CONTRACTOR SUPPORT OF FLIGHT TEST PROGRAM. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-822 178 1/1 1/3
PRINCETON UNIV N J

THE PRINCETON PENNSYLVANIA ARMY AVIONICS RESEARCH PROGRAM. (U)

DESCRIPTIVE NOTE: ANNUAL REPT. NO. 1, 1 JUN 66-30 MAY 67,
OCT 67 47P DUKES,THEODOR A. ;DURBIN, ENOCH J. ;GRAHAM,FRANK D. ;SCHMITZ,FREDRIC H.;SHARKOFF,EUGENE G. ;
CONTRACT: DA-28-043-AMC-02412(E)
PROJ: DA-1H1-20601-A219
TASK: 1H1-20601-A219-07
MONITOR: ECOM 02412-1

UNCLASSIFIED REPORT

DESCRIPTORS: (•HELICOPTERS, •FORMATION FLIGHT), (•VERTICAL TAKE-OFF PLANES, •AERODYNAMICS), (•INSTRUMENT LANDINGS, HELICOPTERS), (•AERONAUTICS, VERTICAL TAKE-OFF PLANES), CONTROL, THEORY, DYNAMICS, DECELERATION, TAKE-OFF, EQUATIONS OF MOTION, VISIBILITY, FLIGHT PATHS (U)
IDENTIFIERS: •AVIONICS (U)

THE EFFECT OF HELICOPTER DYNAMICS AND CONTROL CHARACTERISTICS ON FORMATION FLIGHT IS A THEORETICAL STUDY OF THE TRAJECTORY LAWS WHICH ARE USED TO DEFINE A FOLLOWER'S NOMINAL POINT AND THE CONTROL LAWS WHICH DETERMINE THE FOLLOWER'S REQUIRED ACTION. EFFECT OF MANEUVERS IS INCLUDED IN THIS EFFORT TO PROVIDE FUNDAMENTAL INFORMATION ON WHICH TO BASE THE DEVELOPMENT OF IFR FORMATION FLIGHT EQUIPMENT FOR THE ARMY. LANDING CONTROL THEORY FOR DECELERATING VTOL AIRCRAFT IS AN ATTEMPT TO OBTAIN OPTIMAL TRAJECTORIES FOR DECELERATING LANDING AND ACCELERATING TAKE-OFF MANEUVERS. THE EFFECT OF ACCELERATION, AERODYNAMIC CONSTRAINTS, AND TERMINAL CONSTRAINTS ARE INCLUDED IN THE PROBLEM FORMULATION. SIMPLIFIED EQUATIONS OF MOTION ARE DEVELOPED AND POSSIBLE SCHEMES FOR THEIR SOLUTION ARE INVESTIGATED IN THIS START TOWARD PROVIDING INFORMATION ON WHICH DEVELOPMENT OF GUIDANCE EQUIPMENT CAN BE BASED. A SYSTEM STUDY OF LOW VISIBILITY APPROACH AND LANDING IS AN EFFORT TO COMBINE THE CONTROL CHARACTERISTICS OF HELICOPTERS WITH THE PERFORMANCE CHARACTERISTICS OF THE PILOT TO DETERMINE GUIDANCE PARAMETERS NEEDED FOR LOW VISIBILITY APPROACHES. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07/

AD-833 270 1/3 20/4
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING

SIMPLIFIED APPROXIMATIONS OF INTERFERENCE EFFECTS ON JET V/STOL AIRCRAFT. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
MAR 68 96P ARCHINO,DAVID THOMAS ;
REPT. NO. GAM/AE/68-2

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, GROUND EFFECT), STABILITY, SHORT TAKE-OFF PLANES, LIFT, HOVERING, PITCH(MOTION), COMPRESSIBLE FLOW, MATHEMATICAL PREDICTION, TEMPERATURE, AERODYNAMIC CONFIGURATIONS, APPROXIMATION(MATHEMATICS), CORRECTIONS, COMPUTER PROGRAMS, THESES (U)
IDENTIFIERS: *JET INTERFERENCE EFFECTS, TRANSITION FLIGHT (U)

A SEMI-EMPIRICAL APPROACH IS USED TO PREDICT PERFORMANCE LOSSES AND PITCHING MOMENTS CAUSED BY INTERFERENCE EFFECTS ON DIFFERENT AIRCRAFT PLANFORMS IN HOVER AND TRANSITION. DIFFERENT AIRCRAFT PLANFORMS, AND VARIATION OF THE JET EXHAUST COMBINATIONS MAKE THE PROBLEM OF PREDICTING INTERFERENCE EFFECTS DIFFICULT. THE INDUCED FLOW THAT CAUSES THE PERFORMANCE LOSSES IN HOVER IS SUPERIMPOSED ON THE FREE STREAM FLOW TO DETERMINE THE INTERFERENCE EFFECTS ON PERFORMANCE AND PITCH DURING TRANSMISSION. AN EMPIRICAL FACTOR IS USED TO CORRECT FOR THE COMPRESSIBILITY AND TEMPERATURE EFFECTS OF THE JET EXHAUST ON THE INDUCED FLOW. RESULTS ARE COMPUTED ON THE IBM 7094 COMPUTER. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-833 396 1/3 20/4 12/1
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING

THE APPROXIMATE LONGITUDINAL STABILITY DERIVATIVES OF A VECTORED THRUST VTOL. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS
MAR 68 153P WINTERS, CHARLES P. ;
REPT. NO. GAM/AE/68-11

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, AERODYNAMIC CHARACTERISTICS), (*JET FIGHTERS, STABILITY), SUPERSONIC PLANES, PITCH(MOTION), THRUST, PERFORMANCE(ENGINEERING), LIFT, ACCELERATION, HOVERING, EQUATIONS OF MOTION, DRAG, COMPUTER PROGRAMS, NONLINEAR SYSTEMS, DOWNWASH, THRUST, WEIGHT, ANGLE OF ATTACK, THESES, MATHEMATICAL ANALYSIS (U)
IDENTIFIERS: P-1127 AIRCRAFT, TRANSITION FLIGHT, PRESSURE GRADIENTS, COMPUTER ANALYSIS (U)

THE OBJECTIVE OF THIS STUDY WAS TO INVESTIGATE THE STABILITY DERIVATIVES AND THE STABILITY OF THE VECTORED THRUST P-1127 AIRPLANE. EXPRESSIONS WERE DERIVED FOR THE DERIVATIVES. THE PERFORMANCE, DERIVATIVES AND STABILITY WERE FOUND FOR BOTH AN ACCELERATING AND NONACCELERATING TRANSITION FROM HOVER TO CONVENTIONAL FLIGHT. THE RESULTS OF THE ACCELERATING TRANSITION WERE COMPARED TO VALUES AVAILABLE FROM HAWKER SIDDELEY: BOTH TRANSITIONS WERE UNSTABLE FOR MANY AIRSPEEDS BUT THE TIMES TO DOUBLE AMPLITUDE WERE SUCH THAT A PILOT COULD CONTROL THE AIRPLANE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-867 306 1/3
SYSTEMS TECHNOLOGY INC HAWTHORNE CALIF

ANALYSIS OF VTOL HANDLING QUALITIES REQUIREMENTS. PART II. LATERAL-DIRECTIONAL HOVER AND TRANSITION. (U)

DESCRIPTIVE NOTE: FINAL REPT. JUL 68-JAN 70, FEB 70 234P CRAIG,SAMUEL J. ;CAMPBELL, ANTHONY ;
REPT. NO. STI-TR-181-1
CONTRACT: AF 33(615)-3736
PROJ: AF-698DC
TASK: 698DL00
MONITOR: AFFDL TR-67-179-PT-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO PART I, AD-845 165.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, HANDLING), HOVERING, PITCH(MOTION), PILOTS, PERFORMANCE(HUMAN), FLIGHT CONTROL SYSTEMS, MATHEMATICAL ANALYSIS (U)
IDENTIFIERS: TRANSITION FLIGHT, CLOSED LOOP CONTROL SYSTEMS (U)

ANALYSES OF AVAILABLE HANDLING QUALITIES DATA WERE PERFORMED TO DETERMINE LATERAL/DIRECTIONAL DYNAMIC REQUIREMENTS FOR VTOL AIRCRAFT IN HOVER AND LOW SPEED FLIGHT. THE BASIS FOR THIS TREATMENT IS AN EXAMINATION OF THE PILOT/VEHICLE AS A CLOSED-LOOP SERVO SYSTEM. THE QUASI-LINEAR PILOT DESCRIBING FUNCTION IS APPLIED. THE RESULTS OF THE STUDIES SUGGEST THAT THE PRIMARY FACTORS IDENTIFYING SATISFACTORY AND UNACCEPTABLE HOVER MODE DYNAMIC FEATURES ARE RELATED TO THE CLOSED-LOOP DEFICIENCIES. DETAILED CONSIDERATION IS MADE OF THE CONTROL TASK AND PILOTING FUNCTIONS IN TRANSITION FLIGHT. THE RESULTS OF THIS GENERIC APPRAISAL ARE EVOKED TO CONFIRM AND JUSTIFY PRELIMINARY LATERAL/DIRECTIONAL REQUIREMENT FOR CONTROL IN TRANSITION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-871 154 1/3 14/2
NORTHROP CORP HAWTHORNE CALIF AIRCRAFT DIV

A STUDY OF V/STOL GROUND-BASED SIMULATION TECHNIQUES. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 FEB 68-1 JAN 70,
APR 70 43P SINACORI,JOHN B. ;
REPT. NO. NOR-69-168
CONTRACT: DAAJ02-68-C-0019
PROJ: DA-1-F-162204-A-142
TASK: 1-F-162204-A-14233
MONITOR: USAAVLABS TR-70-16

UNCLASSIFIED REPORT

DESCRIPTORS: (•VERTICAL TAKE-OFF PLANES, •FLIGHT SIMULATORS), (•HELICOPTERS, FLIGHT SIMULATORS), SIMULATION, MOTION, PERCEPTION(PSYCHOLOGY), DISPLAY SYSTEMS, PILOTS, SHORT TAKE-OFF PLANES (U)

THE PURPOSE OF THE STUDY IS TO DEFINE THE SIMULATION CHARACTERISTICS REQUIRED TO ESTABLISH THE SIMULATOR AS A RELIABLE AND VALID TOOL IN THE DEVELOPMENT OF V/STOL AIRCRAFT AND HELICOPTERS. A FLIGHT SIMULATOR EMPLOYING THE POINT LIGHT SOURCE PRINCIPLE TO GENERATE A VISUAL DISPLAY WAS USED IN THESE STUDIES. PREVIOUS STUDIES OF A JET-LIFT V/STOL AIRCRAFT IN THIS SIMULATOR UNCOVERED A PILOT-VEHICLE PERFORMANCE DEFICIENCY DURING LATERAL MANEUVERS, RESULTING IN A NAUSEA REACTION WHICH LIMITED PILOT PARTICIPATION. IN THE PRESENT INVESTIGATION, HUMAN MOTION PERCEPTION WAS STUDIED, AND SOLUTIONS TO THIS PILOT-VEHICLE PERFORMANCE DEFICIENCY WERE EVOLVED BY THE USE OF A MOVING BASE. THE RESULTS DEMONSTRATED THAT EFFECTIVE SIMULATION IS POSSIBLE WHEN CERTAIN CONSTRAINTS ARE OBSERVED. THE BEST CONSTRAINTS OF THE DRIVE MECHANISM WERE DETERMINED EXPERIMENTALLY AND WERE COMPARED WITH THOSE IMPLIED FROM PHYSIOLOGICAL CONCEPTS OF HUMAN MOTION PERCEPTION. A SIMULATION VALIDATION RATIONALE WAS ALSO DEVELOPED TO ASSIST THE PILOT IN HIS EVALUATIONS. AN EXAMPLE OF THIS IS DESCRIBED TOGETHER WITH A DISCUSSION OF SOME LIMITATIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-871 424 1/3
PRINCETON UNIV N J DEPT OF AEROSPACE AND MECHANICAL SCIENCES

FEEDBACK CONTROL OF VTOL AIRCRAFT. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
APR 70 69P DUKES,THEODOR A. ;
CONTRACT: DA-44-177-AMC-47(T)
PROJ: DA-1-F-162204-A-142
TASK: 1-F-162204-A-14233
MONITOR: USAAVLABS TR-69-96

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, FLIGHT CONTROL SYSTEMS), (*FLIGHT CONTROL SYSTEMS, FEEDBACK), TRANSPORT PLANES, TILT WINGS, AERODYNAMIC CHARACTERISTICS, STABILITY, AIRPLANE MODELS, SCALE (U)
IDENTIFIERS: XC-142A AIRCRAFT, C-142 AIRCRAFT, *TRANSITION FLIGHT, *FEEDBACK CONTROL (U)

AN APPROXIMATIVE ANALYSIS AND DISCUSSION IS GIVEN OF THE BEHAVIOR OF POLES AND ZEROS CHARACTERIZING THE LONGITUDINAL DYNAMICS OF VTOL AIRCRAFT IN TRANSITION. IN FEEDBACK DESIGN, IT IS A DESIRABLE GOAL TO CREATE A DOMINANT ATTITUDE RESPONSE MODE WHICH IS SEPARATED IN FREQUENCY AND VARIES LITTLE THROUGHOUT THE TRANSITION. THE INVESTIGATION DEMONSTRATED THAT THIS GOAL CAN BE ACHIEVED AT FIXED OPERATING POINTS IN TRANSITION WITHOUT ACCURATE PRIOR KNOWLEDGE ABOUT THE BEHAVIOR OF THE STABILITY AND CONTROL DERIVATIVES DURING TRANSITION. IN THE LONGITUDINAL DEGREES OF FREEDOM, PITCH ATTITUDE AND PITCH RATE FEEDBACK WERE USED. IN THE LATERAL-DIRECTIONAL DEGREES OF FREEDOM, THE SAME GOAL WAS ACHIEVED BY USING YAW RATE, ROLL ANGLE, AND ROLL RATE FEEDBACK. THE GAINS WERE DETERMINED BY AN APPROXIMATE PROCEDURE. LONGITUDINAL AND LATERAL-DIRECTIONAL EXPERIMENTS WERE PERFORMED WITH A 0.1 SCALE MODEL OF THE XC-142A TILT-WING VTOL AIRCRAFT. PULSE RESPONSES OF THE FREE-FLYING MODEL ARE PRESENTED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /20M07

AD-873 037 1/3
NORTHROP CORP HAWTHORNE CALIF AIRCRAFT DIV

APPLICATION OF THE NORTHROP ROTATIONAL SIMULATOR TO HELICOPTERS AND V/STOL AIRCRAFT (USER'S GUIDE). (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 FEB 68-1 JAN 70,
MAY 70 91P SINACORI,JOHN B. ;
REPT. NO. NOR-70-6
CONTRACT: DAAJ02-68-C-0019
PROJ: DA-1-F-162204-A-142
TASK: 1-F-162204-A-14233
MONITOR: USAAVLABS TR-70-26

UNCLASSIFIED REPORT

DESCRIPTORS: (*FLIGHT SIMULATORS, OPERATION), (*HELICOPTERS, FLIGHT SIMULATORS), (*VERTICAL TAKE-OFF PLANES, FLIGHT SIMULATORS), EXPERIMENTAL DESIGN, VISUAL SIGNALS, MATHEMATICAL MODELS, INTERFACES (U)

THE PURPOSE OF THE DOCUMENT IS TO SUGGEST GUIDELINES TO BE USED IN DEVELOPING SOFTWARE INTERFACE COMPUTATIONS SO AS TO EFFECTIVELY INTEGRATE THE PILOT AND MATHEMATICAL VEHICULAR REPRESENTATION TO THE NORTHROP ROTATIONAL SIMULATOR. A DESCRIPTION OF ALL KEY ELEMENTS AND THEIR PERFORMANCE AND OPERATING CHARACTERISTICS IS INCLUDED, PAST USES AND PROJECTED FUTURE USES ARE ALSO GIVEN. SOME VALIDATION METHODS ARE DESCRIBED WITH SUGGESTIONS FOR THEIR USE. SUGGESTED INTERFACE MECHANIZATIONS ARE GIVEN WHICH PROVIDE EFFECTIVE VISUAL AND MOTION STIMULI COMPATIBLE WITH SENSORY CHARACTERISTICS. A RATIONALE FOR THE USE OF MOTION IS INCLUDED. A METHOD IS OUTLINED WHICH ASSISTS THE USER IN ASSESSING THE PROBABILITY OF SUCCESS IN ANY DESIRED SIMULATION AND PREPARATION OF AN EFFECTIVE EXPERIMENTAL DESIGN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-873 821 14/2 20/4 1/3
ARMY AVIATION MATERIEL LABS FORT EUSTIS VA

SUITABILITY OF A DRAG SPHERE ANEMOMETER FOR MEASUREMENT OF VTOL AIRCRAFT DOWNWASH. (U)

DESCRIPTIVE NOTE: TECHNICAL NOTE,
JUN 70 27P STANTON,RUSSELL O. ;
REPT. NO. USAAVLABS-TN-4

UNCLASSIFIED REPORT

DESCRIPTORS: (*ANEMOMETERS, PERFORMANCE(ENGINEERING)); (*VERTICAL TAKE-OFF PLANES, *DOWNWASH), WIND, DRAG, SPHERES, MEASUREMENT, HELICOPTERS, HOVERING (U)

TESTS WERE CONDUCTED ON A SIMPLE, LOW-COST DRAG SPHERE ANEMOMETER TO DETERMINE ITS SUITABILITY FOR MEASURING WIND VELOCITIES IN THE VICINITY OF VTOL AIRCRAFT AND HELICOPTERS. A DRAG SPHERE ANEMOMETER IS A DEVICE FOR DETERMINING WIND VELOCITY BY MEASURING THE DRAG FORCE ACTING ON A SPHERICAL BODY OF KNOWN DRAG COEFFICIENT. THE DRAG SPHERE ANEMOMETER, AS TESTED, WAS FOUND TO BE CAPABLE OF MEASURING WIND VELOCITIES AND DIRECTION IN ONE PLANE OVER A SPEED RANGE OF 10 TO 110 MPH. INSTRUMENTATION ACCURACY WAS FOUND TO BE PLUS OR MINUS 2.5 MPH IN THE SPEED RANGE OF 10 TO 50 MPH AND PLUS OR MINUS 7% IN THE SPEED RANGE OF 50 TO 110 MPH. DIRECTIONAL ACCURACY WAS FOUND TO BE APPROXIMATELY PLUS OR MINUS 30 DEG. AT LOW WIND SPEEDS, PLUS OR MINUS 10 DEG. FOR SPEEDS FROM 30 TO 60 MPH, AND PLUS OR MINUS 5 DEG. ABOVE 60 MPH. ON THE BASIS OF THE RELATIVELY UNSOPHISTICATED TESTS PERFORMED, THE DRAG SPHERE ANEMOMETER IS CONSIDERED TO BE SUITABLE FOR MEASUREMENT OF DOWNWASH VELOCITIES IN CLOSE PROXIMITY TO HOVERING VTOL AIRCRAFT. IF REQUIRED, THE UPPER END OF THE USABLE SPEED RANGE COULD BE EXTENDED THROUGH ADDITIONAL WIND-TUNNEL CALIBRATION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-874 029 1/3 13/7 20/4
FRANKLIN INST RESEARCH LABS PHILADELPHIA PA

FLUIDIC VORTEX ANGULAR RATE SENSOR CONCEPT INVESTIGATION FOR HELICOPTERS AND V/STOL AIRCRAFT. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
APR 70 46P WACHTELL,G. P. ;
CONTRACT: DAAJ02-69-C-0010
PROJ: DA-1-F-162203-A-141
TASK: 1-F-162203-A-14186
MONITOR: USAAVLABS TR-70-25

UNCLASSIFIED REPORT

DESCRIPTORS: (*FLOWMETERS, *FLUIDICS), (*STABILIZATION SYSTEMS, *HELICOPTERS), (*VERTICAL TAKE-OFF PLANES, STABILIZATION SYSTEMS), VORTICES, FLOW VISUALIZATION, GYROSCOPES, PRESSURE, FEASIBILITY STUDIES, SENSORS (U)
IDENTIFIERS: VAJARS(VORTEX AXIS JET ANGULAR RATE SENSORS), *VORTEX AXIS JET ANGULAR RATE SENSORS (U)

AN EXPERIMENTAL INVESTIGATION WAS UNDERTAKEN TO ESTABLISH THE FEASIBILITY OF SENSOR CONCEPTS FOR APPLICATION IN HELICOPTER AND V/STOL AIRCRAFT STABILITY AUGMENTATION SYSTEMS. THEORIES OF VARIOUS POSSIBLE RATE SENSING DEVICES BASED ON RAPID VORTEX FLOWS ARE PRESENTED, WITH EXPERIMENTAL DEMONSTRATION OF THE PRINCIPLE OF ONE IN WHICH THE SWIRL FLOW AXIS LAGS BEHIND THE CHAMBER AXIS WHEN THE CHAMBER IS ROTATED ABOUT A LINE PERPENDICULAR TO ITS AXIS. TWO MODIFICATIONS YIELDED SENSITIVITIES LESS THAN ULTIMATELY DESIRED, BY FACTORS ON THE ORDER OF 2000 AND 200. OBSERVATIONS ON THE FLOW PATTERN IN JETS EMERGING FROM A PAIR OF CONCENTRIC VORTEX CHAMBERS SHOWED THAT THE CONCEPT OF THE VORTEX AXIS JET ANGULAR RATE SENSOR (VAJARS) DISCUSSED THEORETICALLY IN A PREVIOUS FEASIBILITY STUDY WOULD HAVE TO OVERCOME PROBLEMS CREATED BY TURBULENCE AND FLOW REVERSAL ALONG THE AXIS. AN ATTEMPT WAS MADE TO DEMONSTRATE A DEVICE OF HIGH THEORETICAL SENSITIVITY, IN WHICH A CYLINDRICAL CORE SUPPORTED ON AN AXIS PERPENDICULAR TO THE CORE AXIS IS SUBJECTED TO A TORQUE DUE TO THE PRESSURE GRADIENT GENERATED IN AN ANNULAR PASSAGE BY CORIOLIS FORCES. THEORETICAL DISCUSSIONS ARE ALSO GIVEN OF A GYROSCOPE IN WHICH THE FLUID STREAM IS THE ROTOR, (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-875 238 1/3
GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF

EFFECTS OF HIGH-LIFT DEVICES ON V/STOL AIRCRAFT PERFORMANCE. VOLUME II. BIBLIOGRAPHY. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JUL 70 22oP HEBERT,JOSEPH , JR.;
PEDERSON,S. K. ;
CONTRACT: DAAJ02-69-C-0079
PROJ: DA-1-F-162204-A-142
TASK: 1-F-162204-A-14231
MONITOR: USAAVLABS TR-70-33B

UNCLASSIFIED REPORT

DESCRIPTORS: (•VERTICAL TAKE-OFF PLANES, •LIFT), SHORT TAKE-OFF PLANES, TILT WINGS, FLAPS, BOUNDARY LAYER CONTROL, DOWNWASH, GROUND EFFECT, HANDLING, BIBLIOGRAPHIES, PERFORMANCE(ENGINEERING) (U)

ALL TYPES OF HIGH-LIFT DEVICES ARE COVERED, BOTH EXPERIMENTAL AND THEORETICAL TOPICS ARE REVIEWED, AND THE SELECTED REPORTS ARE LISTED BY A SUBJECT AND AN AUTHOR INDEX. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-878 075 1/3
GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF

EFFECTS OF HIGH-LIFT DEVICES ON V/STOL AIRCRAFT PERFORMANCE. VOLUME I. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUN 69-31 MAY 70, OCT 70 185P HEBERT,J. ;PEDERSON,S. ; CARROLL,J. ;LAUDEMAN,E. ;WHITNEY,C. ;
CONTRACT: DAAJ02-69-C-0079
PROJ: DA-1-F-162204-A-142
TASK: 1-F-162204-A-14231
MONITOR: USAAVLABS TR-70-33A

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 2, AD-875 238.

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, *LIFT), SHORT TAKE-OFF PLANES, TWO-DIMENSIONAL FLOW, FLAPS, AIRFOILS, PROPELLERS(AERIAL), LOADING(MECHANICS), DOWNWASH, TILT WINGS, PERFORMANCE(ENGINEERING) (U)

THE PURPOSE OF THE STUDY WAS TO DEVELOP A UNIFIED ANALYTICAL PROCEDURE TO EVALUATE THE EFFECTS OF PASSIVE HIGH-LIFT DEVICES ON DEFLECTED-SLIPSTREAM OR TILT-WING V/STOL CONFIGURATIONS. METHODS WERE DEVELOPED TO PREDICT THE TWO-DIMENSIONAL FLAPPED AIRFOIL CHARACTERISTICS TO BE USED IN A SPAN LOAD PROGRAM. THE SPAN LOAD RESULTS ARE USED IN PROCEDURES FOR ESTIMATING THE COEFFICIENTS OF LIFT, LONGITUDINAL FORCE, AND MOMENT FOR A WING PARTIALLY IMMERSED IN A PROPELLER SLIPSTREAM. THESE CHARACTERISTICS CAN THEN BE USED IN A PERFORMANCE PROGRAM DEVELOPED TO CALCULATE THE TAKEOFF, LANDING, AND TRANSITION MANEUVERS. IN ADDITION TO THESE TASKS, INVESTIGATIONS WERE MADE INTO DOWNWASH CHARACTERISTICS, WIND TUNNEL WALL CORRECTIONS, AND CORRELATIONS OF FLIGHT TEST DATA WITH THEORY. AN ANALYSIS OF THE EFFECTS OF HIGH-LIFT DEVICES ON THE PERFORMANCE OF A TILT-WING V/STOL CONFIGURATION IS INCLUDED IN THE APPENDIX. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-884 439 1/3
CORNELL AERONAUTICAL LAB INC BUFFALO N Y FLIGHT RESEARCH DEPT

BACKGROUND INFORMATION AND USER GUIDE FOR MIL-F-83300-MILITARY SPECIFICATION -- FLYING QUALITIES OF PILOTED V/STOL AIRCRAFT. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
MAR 71 469P CHALK,CHARLES R. ;KEY, DAVID L. ;KROLL,JOHN , JR.;WASSERMAN,RICHARD ;RADFORD,ROBERT C. ;
CONTRACT: AF 33(615)-3736, F33615-70-C-1322
PROJ: AF-698DC
MONITOR: AFFDL TR-70-88

UNCLASSIFIED REPORT

DESCRIPTORS: (*VERTICAL TAKE-OFF PLANES, PERFORMANCE(ENGINEERING)), (*SHORT TAKE-OFF PLANES, SPECIFICATIONS), MILITARY REQUIREMENTS, STATE-OF-THE-ART REVIEWS, FLIGHT TESTING, HOVERING (U)

THE SPECIFICATION WAS COMPILED AFTER AN EXTENSIVE LITERATURE REVIEW AND MANY MEETINGS AND DISCUSSIONS WITH PERSONNEL FROM ESSENTIALLY ALL CONCERNED CIVILIAN AND GOVERNMENTAL ORGANIZATIONS. THE REPORT ATTEMPTS TO EXPLAIN THE CONCEPT AND PHILOSOPHY UNDERLYING THE V/STOL SPECIFICATION AND TO PRESENT SOME OF THE DATA AND ARGUMENTS UPON WHICH THE REQUIREMENTS WERE BASED. THE DOCUMENT SHOULD ALSO SERVE AS A SUMMARY OF THE STATE OF THE V/STOL FLYING QUALITIES ART AS DETERMINED FROM FLIGHT TEST, SIMULATION, ANALYSIS, AND THEORY. (AUTHOR) (U)

CORPORATE AUTHOR - MONITORING AGENCY

*ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT PARIS (FRANCE)

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AGARD-CP-22
FLUID DYNAMICS OF ROTOR AND FAN SUPPORTED AIRCRAFT AT SUBSONIC SPEEDS.
AD-669 226

*AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO

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ASD-TR-67-18
QUANTITATIVE TERRAIN STUDY OF VTOL LANDING SITE DISTRIBUTIONS AND OF EFFECTS ON PENETRATION.
AD-661 592

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ASD-TR-69-15-PT-2
PROPELLER STATIC PERFORMANCE TESTS FOR V/STOL AIRCRAFT. PART II. TEST DATA (APPENDIX III).
AD-708 742

*AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

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ARL-71-0113
LOW AREA RATIO THRUST AUGMENTING EJECTORS.
AD-728 546

*AIR FORCE AERO PROPULSION LAB WRIGHT-PATTERSON AFB OHIO

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TDR64 104
TEST RESULTS OF RESEARCH FOR RAPID SITE PREPARATION FOR VTOL AIRCRAFT.
AD-455 562

*AIR FORCE FLIGHT DYNAMICS LAB WRIGHT-PATTERSON AFB OHIO

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AFFDL-TM-70-1-FYA
THE ACOUSTIC ENVIRONMENT OF A DEFLECTED-JET VTOL AIRCRAFT.
AD-715 939

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AFFDL-TR-65-200
APPLICATION OF PILOT-CONTROLLER INTEGRATION TECHNIQUES TO A REPRESENTATIVE V/STOL AIRCRAFT.
AD-633 269

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AFFDL-TR-67-37
EXTERNAL VISIBILITY CRITERIA FOR VTOL AIRCRAFT.
AD-655 072

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AFFDL-TR-67-93
EFFECTS OF GUST VELOCITY SPATIAL DISTRIBUTIONS ON LATERAL-DIRECTIONAL RESPONSE OF A VTOL AIRCRAFT.
AD-657 321

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AFFDL-TR-67-179-PT-2
ANALYSIS OF VTOL HANDLING QUALITIES REQUIREMENTS. PART II. LATERAL-DIRECTIONAL HOVER AND TRANSITION.
AD-867 306

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AFFDL-TR-67-187
AN OPTIMAL CONTROL METHOD FOR PREDICTING CONTROL CHARACTERISTICS AND DISPLAY REQUIREMENTS OF MANNED VEHICLE SYSTEMS.
AD-672 272

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AFFDL-TR-69-41
A FLIGHT INVESTIGATION OF LATERAL-DIRECTIONAL HANDLING QUALITIES FOR V/STOL AIRCRAFT IN LOW SPEED MANEUVERING FLIGHT.
AD-707 631

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AFFDL-TR-69-81
APPLICATION OF OPTIMAL CONTROL THEORY TO THE PREDICTION OF HUMAN PERFORMANCE IN A COMPLEX TASK.
AD-704 562

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AFFDL-TR-69-120
A NEW APPROACH TO THE SPECIFICATION AND EVALUATION OF FLYING QUALITIES.
AD-710 590

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AFFDL-TR-69-123-VOL-2
A STABILITY AND CONTROL

PREDICTION METHOD FOR HELICOPTERS AND STOPPABLE ROTOR AIRCRAFT. VOLUME II: USER'S MANUAL.
AD-706 918

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AFFDL-TR-69-123-VOL-3
A STABILITY AND CONTROL PREDICTION METHOD FOR HELICOPTERS AND STOPPABLE ROTOR AIRCRAFT. VOLUME III: PROGRAMMER'S MANUAL.
AD-706 374

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AFFDL-TR-69-123-VOL-4
A STABILITY AND CONTROL PREDICTION METHOD FOR HELICOPTERS AND STOPPABLE ROTOR AIRCRAFT. VOLUME IV: APPENDICES.
AD-706 919

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AFFDL-TR-70-40
THE 'PAPER-PILOT' -- A DIGITAL COMPUTER PROGRAM TO PREDICT PILOT RATING FOR THE HOVER TASK.
AD-724 144

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AFFDL-TR-70-88
BACKGROUND INFORMATION AND USER GUIDE FOR MIL-F-83300-MILITARY SPECIFICATION -- FLYING QUALITIES OF PILOTED V/STOL AIRCRAFT.
AD-884 439

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AFFDL-TR-70-90
AN INVESTIGATION OF THE TRAILING VORTEX SYSTEM GENERATED BY A JET-FLAPPED WING OPERATING AT HIGH WING LIFT COEFFICIENTS.
AD-715 315

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AFFDL-TR-70-154-VOL-1
A WIND TUNNEL INVESTIGATION OF JETS EXHAUSTING INTO A CROSSFLOW. VOLUME I. TEST DESCRIPTION AND DATA ANALYSIS.
AD-718 122

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AFFDL-TR-70-154-VOL-2
A WIND TUNNEL INVESTIGATION OF JETS EXHAUSTING INTO A CROSSFLOW. VOLUME II. ADDITIONAL DATA FOR THE ONE-JET CONFIGURATION.
AD-720 232

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AFFDL-TR-70-154-VOL-3
A WIND TUNNEL INVESTIGATION OF JETS EXHAUSTING INTO A CROSSFLOW. VOLUME III. ADDITIONAL DATA FOR TWO-JET CONFIGURATIONS.
AD-720 233

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AFFDL-TR-70-154-VOL-4
A WIND TUNNEL INVESTIGATION OF JETS EXHAUSTING INTO A CROSSFLOW. VOLUME IV. ADDITIONAL DATA FOR THE THREE-JET CONFIGURATION.
AD-718 123

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AFFDL-TR-70-170
A THEORETICAL INVESTIGATION OF A CIRCULAR LIFTING JET IN A CROSS-FLOWING MAINSTREAM.
AD-718 121

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AFFDL-TR-71-3
AERODYNAMIC STABILITY AND CONTROL/WIND TUNNEL DATA CORRELATION.
AD-726 103

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AFFDL-TR-71-23
THE GENERATION OF A MILITARY SPECIFICATION FOR FLYING QUALITIES OF PILOTED V/STOL AIRCRAFT-MIL-F-83300.
AD-725 746

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AFFDL-TR-71-26-VOL-6
WIND TUNNEL TEST OF A POWERED TILT-ROTOR DYNAMIC MODEL ON A SIMULATED FREE FLIGHT SUSPENSION SYSTEM. VOLUME VI.
AD-735 633

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AFFDL-TR-71-62-VOL-7
WIND TUNNEL TEST OF THE AERODYNAMICS AND DYNAMICS OF ROTOR SPINUP, STOPPING AND FOLDING ON A SEMISPAN FOLDING TILT-ROTOR MODEL. VOLUME VII.
AD-736 825

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AFFDL-TR-71-91

CYCLIC PITCH CONTROL ON A V/STOL TILT WING AIRCRAFT.
AD-734 066

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AFFDL-TR-71-91-REF-5
1/3 SCALE V/STOL CYCLIC PITCH PROPELLERS; RESULTS OF WIND TUNNEL TESTS.
AD-734 237

•AIR FORCE FLIGHT TEST CENTER EDWARDS AFB CALIF

• • •

FTC-TR-66-29
IMPORTANT VSTOL AIRCRAFT STABILITY DERIVATIVES IN HOVER AND TRANSITION.
AD-641 371

•AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING

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GAM/AE/68-2
SIMPLIFIED APPROXIMATIONS OF INTERFERENCE EFFECTS ON JET V/STOL AIRCRAFT.
AD-833 270

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GAM/AE/68-11
THE APPROXIMATE LONGITUDINAL STABILITY DERIVATIVES OF A VECTORED THRUST VTOL.
AD-833 396

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GE/EE/65-20
EFFECTS OF WEIGHT, INERTIA, AND VELOCITY ON CONTROL POWER REQUIREMENTS FOR VTOL AIRCRAFT.
AD-623 100

•AIR FORCE OFFICE OF SCIENTIFIC RESEARCH ARLINGTON VA

• • •

AFOSR-TR-71-2211
OPTIMAL AND SUBOPTIMAL CONTROL SYNTHESIS FOR MINIMUM TIME VTOL TRANSITION.
AD-728 112

•AIR-VEHICLE CORP SAN DIEGO CALIF

• • •

A SLANTED ROUND JET AT LOW FORWARD SPEED.
(AROD-5274:7-E)
AD-728 965

•ARMY AERONAUTICAL RESEARCH LAB MOFFETT FIELD CALIF

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MASS FLOW, VELOCITY AND IN-FLIGHT THRUST MEASUREMENTS BY ION DEFLECTION.
AD-713 587

•ARMY AVIATION MATERIEL LABS FORT EUSTIS VA

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USAAVLABS-TR-4
SUITABILITY OF A DRAG SPHERE ANEMOMETER FOR MEASUREMENT OF VTOL AIRCRAFT DOWNWASH.
AD-873 871

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USAAVLABS-TR-65-24
STUDY OF SIZE EFFECTS ON VTOL HANDLING QUALITIES CRITERIA.
AD-622 578

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USAAVLABS-TR-65-29
AIRCRAFT DESIGN XV-9A HOT CYCLE RESEARCH AIRCRAFT.
AD-621 684

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USAAVLABS-TR-65-38
COMPONENT TESTING XV-9A HOT CYCLE RESEARCH AIRCRAFT.
AD-627 361

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USAAVLABS-TR-65-48
AN ANALYTICAL STUDY OF THE DYNAMICS OF AIRCRAFT IN UNSTEADY FLIGHT.
AD-627 370

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USAAVLABS-TR-65-68
GROUND AND FLIGHT TESTS, XV-9A HOT CYCLE RESEARCH AIRCRAFT.
AD-631 413

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USAAVLABS-TR-65-69
A THEORY FOR VTOL PROPELLER

OPERATION IN A STATIC CONDITION.
AD-623 527

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USAAVLABS-TR-65-73
WIND TUNNEL TEST OF 1/7 SCALE MODEL OV-1.
AD-630 924

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USAAVLABS-TR-66-10
XV-9A HOT CYCLE RESEARCH AIRCRAFT PROGRAM.
AD-638 366

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USAAVLABS-TR-66-26
DEVELOPMENT OF A METHOD FOR PREDICTING THE PERFORMANCE AND STRESSES OF VTOL-TYPE PROPELLERS.
AD-635 951

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USAAVLABS-TR-66-45
XV-4A VTOL RESEARCH AIRCRAFT PROGRAM.
AD-635 106

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USAAVLABS-TR-66-53
AN ANALYTICAL STUDY OF FACTORS INFLUENCING THE LONGITUDINAL STABILITY OF TILT-WING VTOL AIRCRAFT.
AD-640 945

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USAAVLABS-TR-66-64
COMPARISON OF LONGITUDINAL STABILITY CHARACTERISTICS OF THREE TILT-WING VTOL AIRCRAFT DESIGNS.
AD-667 983

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USAAVLABS-TR-66-80
AN EXPERIMENTAL INVESTIGATION OF THE LONGITUDINAL DYNAMIC STABILITY CHARACTERISTICS OF A FOUR-PROPELLER TILT-WING VTOL MODEL.
AD-663 848

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USAAVLABS-TR-66-81
20-HOUR FOLLOW-ON FLIGHT TEST PROGRAM, XV-9A HOT CYCLE RESEARCH AIRCRAFT.
AD-647 367

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USAAVLABS-TR-67-26
INVESTIGATIONS OF A VARIABLE AREA SCROLL FOR POWER TRANSFER IN TIP TURBINE LIFT FAN SYSTEMS.
AD-667 989

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USAAVLABS-TR-67-37
PERFORMANCE AND STRESSES OBTAINED ON AN ISOLATED VTOL-TYPE PROPELLER OPERATING IN HOVERING, TRANSITIONAL, AND AXIAL FLIGHT.
AD-661 087

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USAAVLABS-TR-67-53
XV-5A MAINTENANCE AND SYSTEMS EVALUATION.
AD-662 715

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USAAVLABS-TR-67-67
INVESTIGATION OF PROPELLER SLIPSTREAM EFFECTS ON WING PERFORMANCE.
AD-666 247

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USAAVLABS-TR-68-4
DYNAMIC RESPONSE OF THE XC-142A TILT-WING V/STOL AIRCRAFT TO IN-FLIGHT CARGO DELIVERY AT SLOW SPEEDS.
AD-670 965

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USAAVLABS-TR-68-33
FEASIBILITY STUDY OF ADVANCED V/STOL PROPELLER TECHNOLOGY.
AD-671 029

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USAAVLABS-TR-69-96
FEEDBACK CONTROL OF VTOL AIRCRAFT.
AD-871 424

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USAAVLABS-TR-70-16
A STUDY OF V/STOL GROUND-BASED SIMULATION TECHNIQUES.
AD-871 154

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USAAVLABS-TR-70-25
FLUIDIC VORTEX ANGULAR RATE SENSOR CONCEPT INVESTIGATION FOR HELICOPTERS AND V/STOL AIRCRAFT.
AD-874 029

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USAAVLABS-TR-70-26
APPLICATION OF THE NORTHROP ROTATIONAL SIMULATOR TO HELICOPTERS AND V/STOL AIRCRAFT (USER'S GUIDE).
AD-873 037

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USAAVLABS-TR-70-33A
EFFECTS OF HIGH-LIFT DEVICES ON V/STOL AIRCRAFT PERFORMANCE. VOLUME I.
AD-878 075

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USAAVLABS-TR-70-33B
EFFECTS OF HIGH-LIFT DEVICES ON V/STOL AIRCRAFT PERFORMANCE. VOLUME II. BIBLIOGRAPHY.
AD-875 238

*ARMY AVIATION TEST ACTIVITY EDWARDS AFB CALIF

• • •

PRELIMINARY PILOT QUALITATIVE EVALUATION OF THE XV-5A RESEARCH AIRCRAFT.
AD-623 514

*ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

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ECOM-02412-1
THE PRINCETON PENNSYLVANIA ARMY AVIONICS RESEARCH PROGRAM.
AD-822 178

*ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG MISS

• • •

AEWES-3-123
FEASIBILITY STUDY ON THE DESIGN AND DEVELOPMENT OF A VTOL BLAST CONTROLLING PLATFORM.
AD-626 617

*ARMY MATERIEL COMMAND WASHINGTON D C

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AMC-TIR-18.1.3.1
RESEARCH AIRCRAFT, XV-5A.
AD-482 131

*ARMY RESEARCH OFFICE DURHAM N C

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AROD-4506.3-E
AN EXPERIMENTAL STUDY OF ALLEVIATING THE LIMITS ON MINIMUM-SPEED V/STOL WIND-TUNNEL TESTS.
AD-671 091

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AROD-5260.2
ANALYSIS OF A LOW SPEED WIND TUNNEL TEST OF A HIGH MASS RATE VECTORED PROPULSION FLOW MODEL.
AD-613 198

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AROD-5260.3
DATA REPORT FOR LTV LOW SPEED WIND TUNNEL TEST NUMBER 172, TEST OF HIGH MASS RATE VECTORED PROPULSION FLOW MODEL.
AD-612 927

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AROD-5260.5
LTV LOW SPEED WIND TUNNEL TEST NUMBER 190, FOLLOW-ON TEST OF HIGH MASS RATE VECTORED PROPULSION FLOW MODEL.
AD-621 578

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AROD-5274.7-E
A SLANTED ROUND JET AT LOW FORWARD SPEED.
AD-728 965

• • •

AROD-T-2118-E
VORTEX SHEDDING FROM A TURBULENT JET IN A CROSS-WIND.
AD-732 736

*ARMY TRANSPORTATION RESEARCH COMMAND FORT EUSTIS VA

• • •

TRECOM-TR-63-21
RESULTS OF WIND TUNNEL TESTS OF A FULL-SCALE, WING-MOUNTED, TIP-TURBINE-DRIVEN LIFT FAN.
AD-420 785

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TRECOM-TR-63-56
SOME DYNAMIC ASPECTS OF STABILITY IN LOW-SPEED FLYING MACHINES.
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